Appendix B

Macro Corridor Study

San Juan Basin Energy Connect Macro Corridor Study

Prepared for:

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1.0 INTRODUCTION

Tri-State Generation and Transmission Association (Tri-State) is proposing the San Juan Basin Energy Connect Project (Project), which would involve the construction of a 230 kilovolt (kV) transmission line from the Farmington Area in northwest New Mexico to the Ignacio area in La Plata County, Colorado. The line is needed for Tri-State to continue to meet its power supply contractual obligations to its Member System, including La Plata Electric Association, Inc. (LPEA) and to improve the power delivery infrastructure and relieve transmission constraints for the region. The purpose of this Macro Corridor Study (MCS) is to identify alternative transmission line corridors for a transmission line originating at the Shiprock Substation near Farmington, New Mexico, and terminating at the proposed Iron Horse Substation near Ignacio, Colorado. As part of this Project, a second proposed substation, Kiffen Canyon Substation, would be built at an undetermined location in the area north of the existing Glade Switching Station. This substation will have equipment installed to control power flow in the proposed transmission line, as well as the existing 115 kV line. These identified corridors represent the initial phase of the transmission line siting process and will provide flexibility in selecting a preferred and alternative route for the transmission line while minimizing impacts to important resources identified within the Project study area. This document describes the process used to identify preliminary alternative transmission line corridors, divided into four distinct steps:

- Definition of the Study Area
- Resource Data Collection and Evaluation
- Opportunities and Constraints Analysis
- Corridor Identification

Each is described in more detail in Sections 2 through 5. Section 6 outlines the next steps in the process, including future routing activities and National Environmental Policy Act (NEPA) compliance.

2.0 DEFINITION OF STUDY AREA

The first step in the MCS process involved identifying the study area in which the proposed Project would be located. The extent of the study area is determined primarily by the purpose and need for the Project and the electric system requirements and components that are needed to best meet the purpose and need. Studies conducted by Tri-State's Power System Planning Group determined that a line from the Farmington, New Mexico, area to the Ignacio, Colorado, area was needed to meet system needs. The study area was then defined based on boundaries that would allow adequate area to identify multiple feasible and reasonably direct corridor alternatives between these two points. The study area includes portions of San Juan County in New Mexico and La Plata and Montezuma Counties in Colorado; shown in the Project Overview Map (Figure 1).

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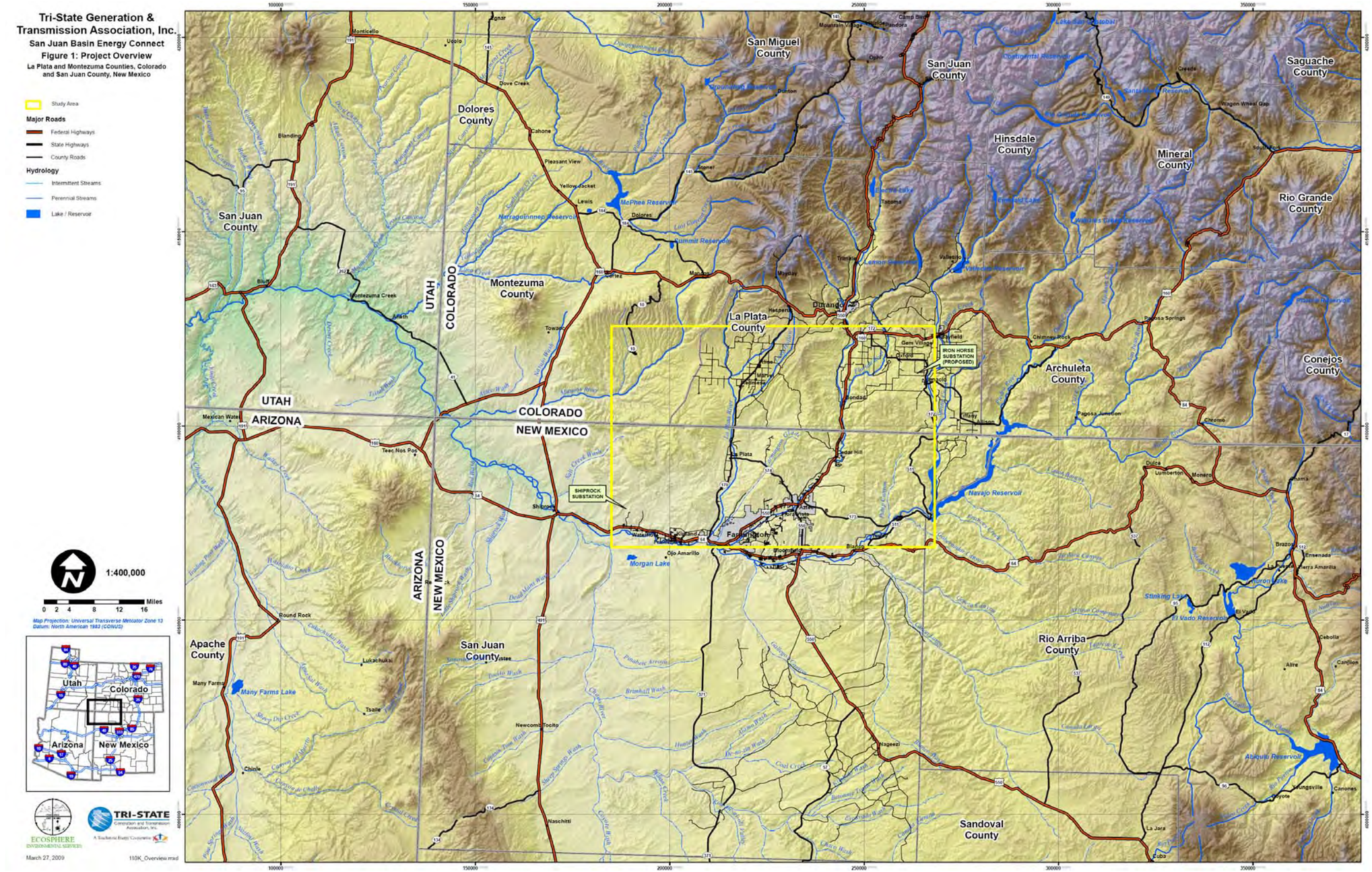

Figure 1. Project Overview Map

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3.0 RESOURCE DATA COLLECTION AND EVALUATION

The second phase of the MCS involved collecting resource data within the study area from management agencies and state and local governments. Resource data obtained from municipalities, counties, state agencies, and utilities were used to prepare Geographic Information System (GIS) resource maps and included the following general resource categories:

- Land Use and Ownership
- Existing Linear Transportation and Utility Corridors
- Water Resources
- Agricultural Resources
- Cultural Resources
- Biological Resources
- Geology and Soils
- Public Use Facilities

All resource information collected reflects existing data readily available from the local, state, and federal agencies. At this time, new field data were not collected within the Project study area to support the opportunities and constraints analysis. Additional data will be collected as needed to support future phases of the routing process. In some cases there were discrepancies between data available in New Mexico vs. that available in Colorado. In future phases of the Project, more detailed data collection will help to resolve this discrepancy.

The resource data were mapped in GIS format and combined with aerial photography to enable the identification of suitable areas for routing the new 230 kV transmission line. As described below, each environmental resource was categorized as an opportunity (suitable area), an avoidance area, or an exclusion area in the GIS opportunity and constraint model.

The following sections describe in more detail each set of resource data that was collected as part of this analysis. Resource maps referenced in this section appear at the end of this document in Appendix A.

4.0 OPPORTUNITIES AND CONSTRAINTS ANALYSIS

Project opportunity and constraint criteria were selected based on resources and Project study area characteristics that provided favorable or unfavorable attributes for locating the transmission line. The criteria classifications include opportunity, avoidance, and exclusion areas associated with each selected resource. Table 1 lists the opportunity and constraint criteria that were identified for the Project.

To assist in identification of preliminary alternative corridors, the GIS data for each resource were categorized based on the opportunity or constraint and a GIS-based model was

developed to map these areas. The degree of opportunity and constraint is based on the character of the resource (i.e., linear or site specific, natural or human, native or disturbed) and the proximity of the transmission line to the resource.

Corridor segments were primarily identified based on areas of greatest opportunity that usually followed existing transportation or utility corridors. Corridors are generally 1 mile in width. In some cases, areas of avoidance or exclusion fall within the identified corridors; however, the corridor width generally allows enough flexibility to identify routes that will avoid most constraints.

Avoidance areas include sensitive areas that are likely to incur environmental impacts or result in land use conflicts if directly affected by the Project. It is preferable to avoid these areas if opportunity areas are available elsewhere for locating the transmission line. If a sensitive area cannot be completely avoided, impacts can be minimized through route refinement, careful placement of the transmission structures and access roads, seasonal restrictions and other mitigation measures.

Exclusion areas include locations with the highest level of sensitivity, including those areas with regulatory or legislative designations or extreme physical constraints not compatible with transmission line construction and/or operation. In general, locating a transmission line in these areas could result in increased environmental impacts, significantly higher costs, and/or additional regulatory approvals.

Figure 2 illustrates those areas identified as opportunities, avoidance areas, and exclusion areas based on the route selection criteria and resource data gathered. Based on this analysis, several corridor segments were identified as opportunities for locating the Project despite the large number of avoidance and exclusion areas within the study area (Figure 3). Though some avoidance and exclusion areas overlap with the identified corridors, the minimum width of corridors is 1 mile, generally allowing enough flexibility to avoid such areas in future routing phases. The following sections describe Project area resources and opportunity and constraint criteria in greater detail.

Table 1. Project opportunities and constraints criteria.

Resource	Opportunity Area (Optimize Use for Routing)	Avoidance Area (Minimize Use for Routing)	Exclusion (Exclude for Routing When Possible)
Land Use and Jurisdiction			
Farmland	Rangeland, agriculture		Center pivot or side role irrigation systems
Urban areas and subdivisions	–	–	Incorporated and unincorporated municipal boundaries (except on either side of an existing transmission line), platted subdivisions
Residences	–	Within 500 feet of an occupied residence	Within 100 feet of an occupied residence
Airports	–	–	Within approach/departure surface (10,000 feet – public, 5,000 feet – private) of an airport runway
Communication/Radio Towers (FCC structures)	–	Within 150 feet of FCC structure	Within 50 feet of FCC structure
Oil and Gas Wells	–	–	Within 50 feet of well pad boundary
Schools, Parks and Recreation Areas	–	Within 0.25 miles	Within 100 feet
Restricted Land Designations	–	–	Within boundary of formally designated state lands (conservation areas, state parks, State Wildlife Area [SWAs], etc.) and, national parks/landmarks/monuments
Areas of Critical Environmental Concern (ACEC)	–	–	Within boundary of federally designated ACEC, except on either side of an existing transmission line
Colorado Natural Heritage Program (CNHP) Potential Conservation Areas (PCAs)	–	Within boundary	–
Surface Mines	–	Within 500 feet of surface mine boundary	–
Coal mine lease areas	–	At appropriate locations within area of known subsidence*	–

Resource	Opportunity Area (Optimize Use for Routing)	Avoidance Area (Minimize Use for Routing)	Exclusion (Exclude for Routing When Possible)
Existing Transportation and Utility Corridors			
Roads (interstate, state, county)	Within 0.25 miles of road	Within 0.25 miles of scenic byway (except area 100 feet on either side of an existing transmission line)	–
Transmission Lines	Within 0.50 miles of existing transmission line (69 kV, 115 kV, 230 kV, 345 kV)	–	–
Pipelines (water, natural gas, oil and $CO_{2)}$	Within 0.5 miles of existing pipeline Rights of Way (ROWs)	–	–
Water Resources			
Surface Water	–	Within 0.125 miles of lakes and perennial streams	Within 100 feet of lakes and perennial streams
Canals/Ditches	Within 100 feet of a canal or ditch	–	–
Wetlands	–	–	Within boundary
Springs	–	–	Within 100 feet of springs
Cultural Resources			
National Register of Historic Places	–	Within 0.125 miles	Within 100 feet
Traditional Cultural Properties	–	–	Within 0.125 mile of traditional cultural properties
Topography			
Slope	–	Slopes greater than 25%	–
Biological Resources			
Big Game (mule deer, elk)	–	Production areas as identified by the Colorado Division of Wildlife (CDOW) and SUIT	–
Aztec Gila and Brack's Cactus	–	Within boundary of mapped potential habitat	–

Resource	Opportunity Area (Optimize Use for Routing)	Avoidance Area (Minimize Use for Routing)	Exclusion (Exclude for Routing When Possible)
Knowlton's Cactus	_	_	Within boundary of mapped potential habitat or special designated area
Bald Eagle	_	_	Within 0.5 miles of known nest and roosting sites
Peregrine Falcon, Golden Eagle, and other raptors	_	_	Within 0.5 miles of known nest sites
Prairie Dog colonies	_	_	Within boundaries of known colonies (BLM)
River Otter	_	_	Within boundary of known habitat or special designated area
Riparian Areas	_	_	Within boundary of known habitat or special designated area
Colorado Pikeminnow	_	_	Within boundary of designated critical habitat

*BHP Billiton considers these subsidence areas available for transmission line construction; however, BHP has asked for consultation with Tri-State if they choose to go through an area of identified subsidence. Specific areas of concern are not available for public release.

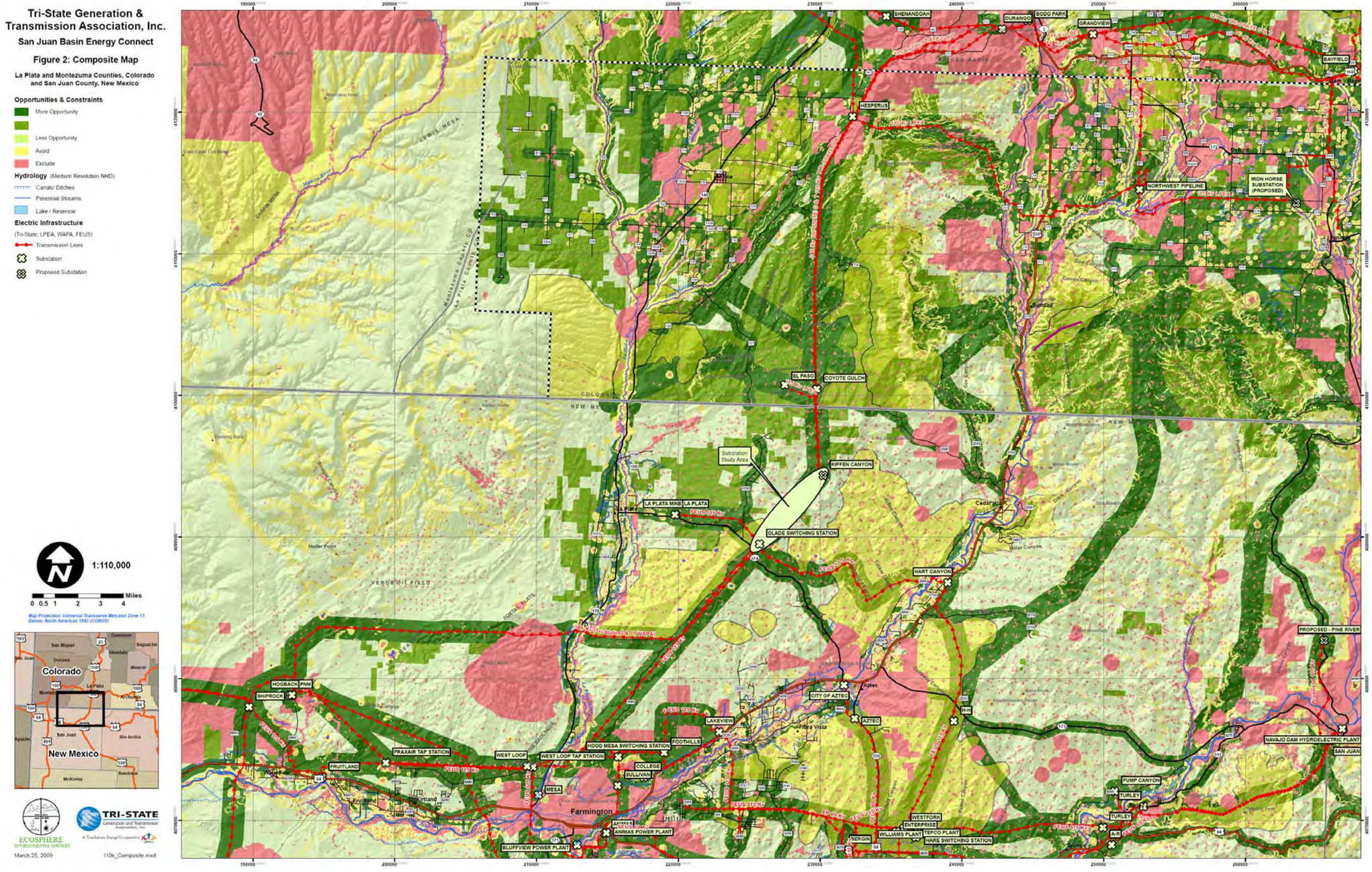

Figure 2. Opportunities, Avoidance Areas, and Exclusion Areas

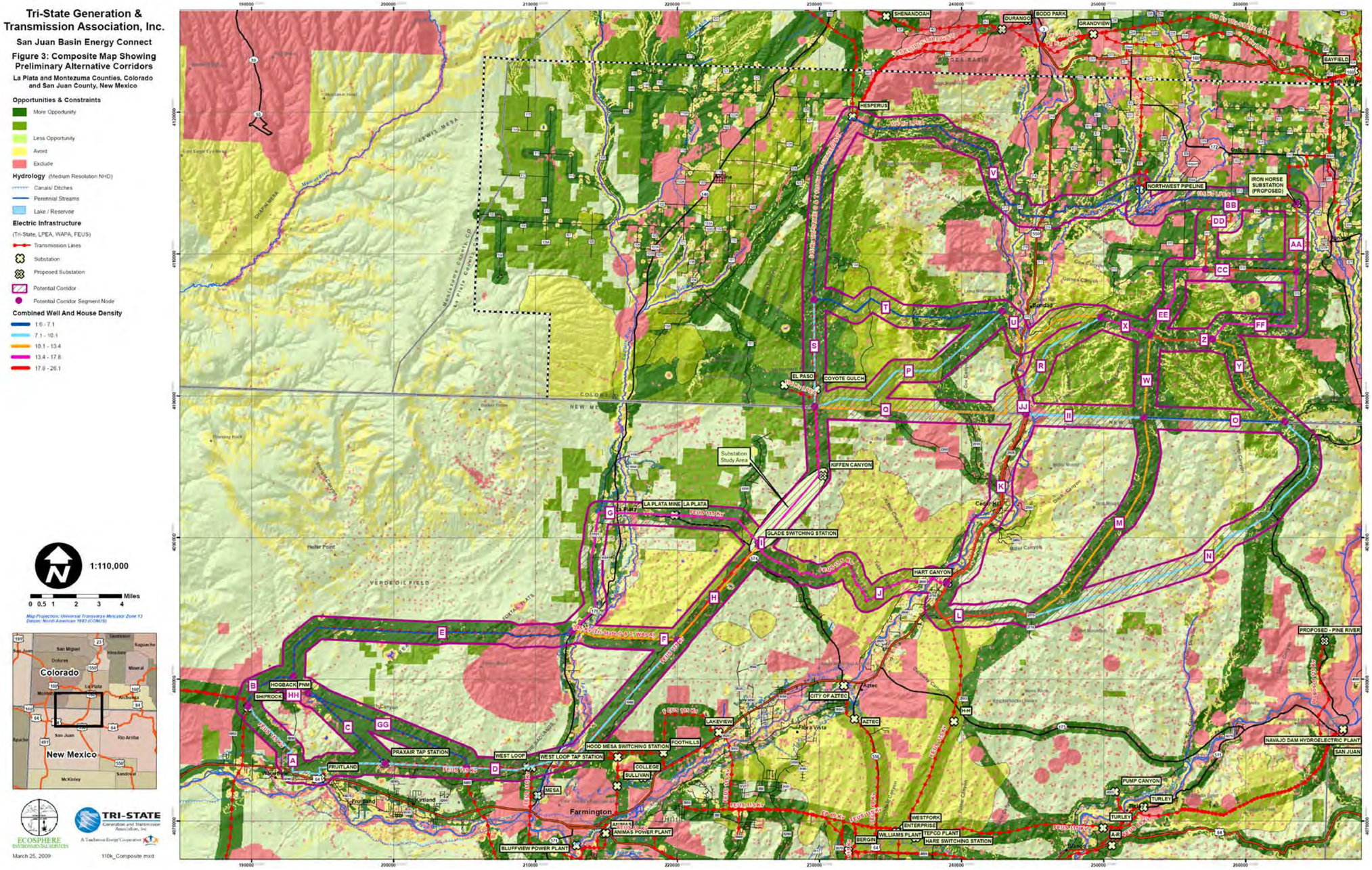

Figure 3. Corridor Segments Identified as Opportunities

4.1 LAND USE AND OWNERSHIP

Land use and land cover data were obtained from the US Geological Survey (USGS) National Land Cover Dataset (2000), SUIT land status data, and Navajo Indian Reservation land status. Land cover describes general land use categories rather than specific designations. For instance, the term "developed" is used to describe residential and commercial uses and is separated out by open space, and low, medium, and high density. Figures A-1 and A-2 show the distribution of land uses in the Project study area. The categories scrub/shrub, grassland/herbaceous, and evergreen forest constitute the majority of the land cover in the Project study area. Land use categories such as agriculture, vacant land, industrial and commercial are considered opportune areas for routing the transmission line.

4.1.1 Jurisdiction

Land jurisdictions within the Project study area consist of private property in Colorado and New Mexico, State of New Mexico, Bureau of Land Management Farmington Field Office (BLMFFO) in New Mexico, BLM San Juan Resource Area (BLMSJRA) in Colorado, and the Southern Ute Indian Reservation (SUIR) and the Ute Mountain Ute Reservation in Colorado.

Data on land ownership were gathered from BLMFFO; Durango Public Lands Office; La Plata County, Colorado; and San Juan County, New Mexico, parcel data as shown in Figure A-3. The Project study area encompasses both the states of Colorado and New Mexico, and tribal lands held by the Ute Mountain Ute Tribe, Southern Ute Indian Tribe and the Navajo Nation. In New Mexico, the majority of the land in the study area consists of federal lands administered by the BLM. The municipalities of Farmington and Aztec, as well as unincorporated areas of Kirtland, Fruitland, Turley and Cedar Hill, are also included. The southern portion of Ute Mountain Ute Indian Reservation lands and a small portion of Navajo Indian Reservation lands are also located in the New Mexico portion of the study area. In Colorado, the majority of the lands are private; however, a large portion of the SUIR and the northeastern portion of Ute Mountain Ute Indian Reservation lands are in the Colorado section of the Project study area. The municipalities of Durango, Bayfield and Ignacio, as well as unincorporated areas of Grandview, Oxford, and Bondad are in the Project study area.

In Colorado, Mesa Verde National Park (MVNP) is located in the northwest corner of the Project study area. The southern portion of the Bodo State Wildlife Area (SWA) is located in the northeastern area of the Project study area just southwest of Durango, Colorado. Approximately 5 miles southeast of Durango is Pastorius Reservoir, a SWA. In New Mexico, the Aztec Ruins National Monument and the Navajo Lake State Park are located within the Project study area. The Aztec Ruins National Monument is located less than a mile from the City of Aztec off Highway 550. Navajo Lake State Park surrounds Navajo Reservoir in the southeast corner of the Project study area.

Exclusion and avoidance areas are identified in Table 1. To the extent feasible, corridors were located outside of municipal boundaries. Areas within boundaries of formally designated state lands, such as conservation areas, state parks, and SWAs, were considered exclusion areas, as were national parks, national landmarks, and national monuments. No wilderness areas, National Land Trust, or stewardship lands exist in the Project study area.

4.1.2 Agriculture

Agricultural uses are largely present along river corridors throughout the Project study area. Pivot irrigation is used in the northeastern corner of the Project study area, in the area between Durango and Ignacio south of Highway 172. These irrigation pivots were digitized by Ecosphere from aerial photographs taken in 2005.

Data regarding regions of prime farmland were provided by the Natural Resource Conservation Service (NRCS) Soil Survey Geographic Database (SSURGO) data and SUIT designated agricultural land status. As shown in Figure A-4, farmland of statewide importance can be found in New Mexico in the San Juan, La Plata and Animas River corridors. There is also a considerable amount of prime farmland in the northwestern portion of the Project study area, as well as in the northeastern corner of the study area including Bayfield and Ignacio and along the Los Piños River corridor south of Ignacio. Agricultural areas with center pivot irrigation were excluded to the extent feasible. Transmission lines can be routed along the edges of irrigated fields if necessary.

4.1.3 Residences and Residential Areas

Subdivision data were collected from the assessor's office for La Plata County, Colorado; however, spatial information on subdivisions is not maintained for San Juan County, New Mexico. The larger residential areas and subdivisions are mainly associated with the towns of Durango, Bayfield, and Ignacio in Colorado, and Farmington and Aztec in New Mexico (see Figure A-2).

Individual homes and other structures within the potential corridors were digitized by Ecosphere to aid in the routing of the transmission line. Areas within 100 feet of an occupied residence were designated as exclusion areas and areas within 500 feet of an occupied residence will be avoided during routing whenever possible. Although some residences are located within the identified corridor segments, generally the width of the identified corridors should allow for flexibility and avoidance of residences.

4.1.4 Airports

Information on airports was obtained from the Federal Aviation Administration (FAA) website (2008). The runways were digitized from aerial photography. Five public airports and one private airfield are located within the Project study area as shown in Figure A-5. In La Plata County, Colorado, the Durango-La Plata County Airport is located southeast of Durango off Highway 172. The Animas Airpark is located 4 miles south of Durango. While it is a privately-owned facility, it is open to the public. In San Juan County, New Mexico, the Aztec Municipal Airport is located just to the northwest of Aztec's city center and the Four Corners Regional Airport is located just west of the outskirts of the City of Farmington, New Mexico. The publicly-owned Navajo Lake Airport is located at Navajo Dam. Williams Field, the only privately owned airfield in the Project study area, is located 2 miles east of Farmington, New Mexico. Williams Field consists of one 2,600-foot dirt runway.

The FAA regulates the proximity of tall structures to approach and departure zones associated with airport runways. The runway glide paths out to 10,000 feet of a public airport and 5,000 feet of a private airport were therefore excluded from potential locations for the Project to maintain ample clearance for aircraft.

4.1.5 Communication and Radio Towers

The Federal Communications Commission (FCC) provided the locations of communication facilities within the Project study area. Communication facilities include television transmission towers, microwave towers, AM/FM radio towers, paging towers, and cellular telephone towers (FCC 2008). These towers are primarily concentrated in and around Durango, Bayfield, and Ignacio, Colorado and Farmington and Aztec, New Mexico. The Mesa Mountain area in La Plata County, Colorado also has a concentration of towers.

The Project will follow all FCC regulations regarding the locations of transmission structures near communication towers. Areas within 50 feet of a communications facility will be excluded and areas within 150 feet of a communications facility were avoided to the extent feasible. The locations of existing communication towers are shown in Figure A-5.

4.1.6 Oil and Gas Development Infrastructure

Data concerning the locations of oil and gas wells were obtained from the Colorado Oil and Gas Conservation Commission; New Mexico data was obtained from New Mexico Oil Conservation Division. Oil and gas well sites occur over most of the Project study area. Publicly available oil and gas well locations are shown in Figure A-6. Well head compressors are utilized on some well pads to assist with natural gas recovery. Pipeline compression and natural gas treatment are provided at pipeline compressor stations located throughout the San Juan Basin. There are no publicly available GIS data available for pipeline compressor station or natural gas treatment facilities within the Project study area. Additional information regarding the scope of mineral development activities within the study area are provided in Section 4.5.1.

Areas within 50 feet of a well pad boundary or 100 feet of a compressor station are exclusion areas. Due to the spacing of well pads, a transmission line oriented along the cardinal directions or at a 45 degree angle to a cardinal direction will be less likely to intersect a well pad.

4.1.7 Schools, Parks, and Recreation Areas

The Census Bureau (2000 and Tiger Line Files 2007) provided data on the location of parks, schools, golf courses, hospitals, and cemeteries. Locations of historic sites were downloaded from the National Park Service National Register Information System (NRIS) database. Campground locations were obtained through an online resource (www.websbestcampingguide.com). In Colorado, data on school locations were obtained from the La Plata County GIS dataset. In New Mexico, no spatial data for schools exists; however, preliminary review suggests the only school outside a municipal boundary is in Kirtland about 7 miles west of Farmington, New Mexico. There are no National Heritage Program sites in the Project study area.

There are three campgrounds located in the Project study area. Two are in Colorado: KOA Durango East is approximately 5 miles east of Durango off Highway 160 and the other is just north of Ignacio. The only identified campground in New Mexico is located on the western shore of Navajo Reservoir in the southeast corner of the Project study area.

Schools, parks, campgrounds, and other recreational areas are shown in Figure A-5. The areas within 100 feet of schools, parks, and recreations areas were designated exclusion areas and areas within 0.25 miles of these features were designated avoidance areas.

4.1.8 Colorado Natural Heritage Program Potential Conservation Areas

Information pertaining to Potential Conservation Areas (PCAs) in the Project study area was provided by the Colorado Natural Heritage Program (CNHP). PCAs are established using the CNHP's best estimate of the primary area required to support the long-term survival of sensitive plant and wildlife species or natural communities. There are a total of 16 PCAs in the Project study area: One area classified as outstanding biodiversity; five areas classified as high biodiversity; four areas classified as moderate biodiversity; and six areas classified as general biodiversity. Avoidance areas were designated within boundaries of PCAs.

4.1.9 Federal Specially Designated Areas

The BLMFFO designated parcels of land as Specially Designated Areas (SDA) in the 2003 Resource Management Plan in order to protect specific resource values within their boundaries (see Figure A-7). Under the broad category of SDA, several sub-classifications occur within the Project study area including Areas of Critical Environmental Concern (ACEC), Geologic Formations, Fossil Areas, Ephemeral Washes, Trail Systems, Wildlife Areas, Recreation Areas, Research Natural Areas (RNA), and Special Management Areas (SMA). Appendix B includes a table listing each SDA name occurring in the Project study area, the sub-classification or type of SDA it is, the resource for which the SDA is designated to protect, management prescriptions specific to Rights of Way (ROWs), any seasonal restrictions that would apply to construction, and the acreage of each SDA. During the agency kick-off meeting in October 2008, the BLMFFO identified that ACECs be designated as exclusion areas when siting this Project. Therefore, ACECs are depicted separately in Figure A-8 and discussed in further detail below.

Area of Critical Environmental Concern

An ACEC is a BLM designation that highlights areas where special management attention is needed to protect and prevent irreparable damage to important historic, cultural and scenic values; fish, wildlife resources or other natural systems or processes; or to protect human life and safety from natural hazards. The BLM establishes special management measures for these areas through land use planning. The designation is a record of significant values that must be accommodated when BLM considers future management actions and land use proposals. ACEC boundary data obtained from BLMFFO are shown on Figure A-8. A summary of BLM management prescriptions for each ACEC is provided in Appendix B. ACECs are designated as exclusion areas, except for adjacent to existing transmission lines.

4.2 EXISTING LINEAR TRANSPORTATION AND UTILITY CORRIDORS

Existing linear facilities and ROWs can provide opportunities for routing new transmission lines. For this Project, roads, natural gas pipelines and transmission lines were identified and mapped as possible opportunities (see Figures A-5). Major highways (state and federal) in the Project area were generated from ESRI "Highways" shape files, while county and local roads were generated from La Plata and San Juan County road GIS files.

There are no active railroad lines within the Project study area. There is an abandoned railroad line route that travels generally northwesterly from Ignacio, Colorado to Durango, Colorado.

Locating a transmission line along these linear features may result in fewer environmental impacts because of the existing disturbance and relatively easy access to the ROW. A general description of Project area transportation features, pipelines and utility line routes is presented below.

4.2.1 Highways/Roads

There are several opportunities for routing the transmission line along existing highways and roads within the Project study area. There are three primary north-south highway corridors that generally follow major river valleys (Los Piños, the Animas and the La Plata Rivers). On the east side of the Project study area, CO Highway 172 and NM Highway 511 run generally north to south within the Los Piños River water shed. Within the middle section of the Project study area, US Highway 550 runs north to south generally parallel with the Animas River. US Highway 550 connects Durango, Colorado, in the north with Aztec and Bloomfield, New Mexico, to the south. On the west side of the Project study area, CO Highway 140 and NM Highway 170 run generally north to south within the La Plata River watershed.

The major east to west transportation corridors within the Project study area are US Highway 160, which parallels the northern boundary of the study area, and US Highway 64, which parallels the southern boundary of the study area. Within San Juan County, New Mexico, Highway 173 and NM Highway 574 provide general east to west access across the central section of the Project study area. NM Highway 516 connects Aztec, New Mexico, with Farmington, New Mexico. Within La Plata County, Colorado, County Road 310/318 is the primary east to west travel route within the eastern section of the Project study area. There are no generally east to west trending connector routes from the central to the western portion of La Plata County due to topography (Black Ridge).

There are no designated scenic byways within the Project study area.

4.2.2 Pipeline Rights of Way

The San Juan Basin is one of the largest natural gas fields within the continental U.S. Natural gas development activities are widespread throughout the San Juan Basin in both La Plata, Colorado, and San Juan County, New Mexico. Infrastructure associated with natural gas development activities includes access roads to well pads and well tie pipelines from production wells to collector pipelines. The network of collector pipelines transports the produced natural gas to compression/treatment facilities. There are also major gas transmission lines crossing the Project area that connect compression/treatment facilities to regional markets and transmission hubs.

Pipeline locations are not publicly available for security reasons. The main natural gas transmission center in the San Juan Basin is the Bloomfield hub located just east of Bloomfield, New Mexico. There is also a major natural gas transmission line (Trans Colorado Pipeline) that crosses the western portion of the Project study area in a southeast to northwest direction. Natural gas pipeline routes in La Plata County, Colorado, were digitized from Colorado Geological Survey maps. Major pipeline routes within San Juan

County, New Mexico, were digitized from aerial photos and field inspection of pipeline routes.

The area within 0.5 miles of existing pipeline ROWs are designated as opportunity areas for siting the proposed transmission line.

4.2.3 Transmission Lines

Existing transmission lines may provide opportunities for routing the new line within or adjacent to existing ROWs where land use and space is appropriate. Locating the new line along existing lines could potentially reduce impacts associated with construction and operation and maintenance of the line, and in general existing transmission lines provide an opportunity corridor.

The following agencies/power suppliers/utilities have transmission lines within the Project area: US Department of Energy - Western Area Power Authority (Western), Tri-State, Public Service of New Mexico (PNM), LPEA, and Farmington Electric Utility Service (FEUS). There are a number of opportunities for locating the Project within 0.5 miles of existing transmission lines in the Project study area as shown in Figure A-5.

Western and Tri-State own the 345 kV large, steel lattice transmission line beginning at the Shiprock Substation and traveling generally east and then north towards Durango, Colorado. FEUS owns the 115 kV transmission line that runs southeast, then east and then northeast from the Shiprock substation. These ROWs generally travel east from the substation and then northeast within a well developed utility corridor through the Farmington Glade area. FEUS also owns a 115 kV line that runs east from Farmington, New Mexico, to the hydroelectric plant at Navajo Dam. There is also a west to east running FEUS 115 kV line starting in Farmington Glade and running east to the Hart Canyon substation.

FEUS has plans to construct a 115 kV line north from the Navajo Dam power plant, but permitting activities have not been completed for the Project. FEUS also has plans to reconstruct their 115 kV transmission line from the Shiprock Substation to Farmington.

The Western and Tri-State lines continue from the New Mexico/Colorado state line north to the Tri-State Hesperus substation. LPEA owns a 115 kV transmission line that runs west to east, originating at the Western/Tri-State line at the north end of the Black Ridge mountain chain. The LPEA 115 kV line then runs generally east-southeast through Ignacio to Bayfield, Colorado.

All of these existing transmission line ROWs may present an opportunity for construction of parallel transmission lines.

4.3 WATER RESOURCES

4.3.1 Surface Water and Wetlands

Data on streams, creeks, rivers, canals, and ditches were collected from the USGS - National Hydrography Dataset and the US Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI). There are three main north to south flowing rivers within the Project study area: the Los Piños, the Animas, and the La Plata. The Los Piños River flows south from

Bayfield, through Ignacio, and then feeds into Navajo Reservoir south of the Colorado/New Mexico state line. The Animas River flows south from Durango, Colorado, to Aztec, New Mexico, and then southwest to its confluence with the San Juan River in Farmington, New Mexico. The La Plata River flows south from Hesperus, Colorado, to its confluence with the San Juan River to the west of Farmington, New Mexico.

The Florida River, a tributary to the Animas River, is located in the north central portion of the Project study area. Rock Creek, a tributary of the Los Piños River, flows generally northwest to southeast within the northeast section of the Project area to its confluence with the Los Piños River in Ignacio. Rock Creek is located adjacent to the parcel where the proposed Iron Horse substation will be located.

The NWI provided information regarding wetland areas, lakes and reservoirs within the Project study area. Two large reservoirs exist in the New Mexico portion: Navajo Reservoir in the southeast corner of the study area, and Farmington Lake/Beeline Reservoir in the south central section. Pastorius Reservoir and Mormon Reservoir in La Plata County and Young's Lake and Andrews Lake in New Mexico are four smaller reservoirs within the Project study area.

Wetland areas within the Project study area are generally located within the floodplains of the rivers and creeks described above. Most of the tributaries to these rivers are ephemeral washes, some of which have areas of riparian plant species, but do not generally contain extensive wetland areas along the entire length of the channels. Wetland areas generated solely from agricultural activities (such as irrigation ditches containing riparian plant species) are generally considered to be not under the US Army Corps of Engineers (ACOE) jurisdiction. Intermittent and ephemeral drainages such as washes and arroyos that are crossed by Project features (access roads, etc.) may be considered ACOE jurisdictional areas, if the ACOE determines significant nexus. Wetlands surveys will be conducted prior to construction so that the transmission line can be routed to minimize impacts to these resources.

Generally, wetlands and surface waters can be avoided through careful pole placement and spanning the transmission line across wetland areas. The maximum distance that can be spanned is approximately 1,100 feet. To prevent construction-related disturbance, such as erosion, sedimentation, and potential water quality impacts, areas within 100 feet of lakes and perennial streams were considered exclusion areas, and areas within 0.125 miles of these features will be avoided to the extent feasible during routing. In addition, structure placement within wetland areas will be avoided when possible. Surface water and wetland features within the Project study area are shown in Figure A-9.

4.3.2 Irrigation Canals and Ditches

A number of irrigation canals and ditches are located within the Project study area, particularly in the mesa top areas on the northeast portion and within floodplain areas of the major river channels. Named canal features include the Ignacio Ditch, King Consolidated Ditch, Coop Ditch, and Florida Canal in La Plata County. Within San Juan County named ditches within the Animas River floodplain area include Farmers Ditch, Stacy Ditch and the Aztec Ditch. On the La Plata River, irrigation ditches include Enterprise Ditch, Greenhorn Ditch and Highland Park Ditch.

Areas within 100 feet of a ditch or canal may provide routing opportunities depending on the width of the available ROW. When the transmission line needs to cross a canal or ditch, the feature would be spanned during construction.

4.4 BIOLOGICAL RESOURCES

4.4.1 Vegetation

The Project study area contains a variety of vegetation/habitat types, including, grasslands/forblands, sagebrush, low elevation shrubland, low elevation rock and sand (badlands), piñon/juniper woodlands, wetland/riparian, aspen forest, oak shrublands, ponderosa pine forests, and mesic mixed conifer. Other portions of the Project study area are dominated by agricultural land uses and urban development (see Figure A-10).

4.4.1.1 Threatened, Endangered and Special Status Flora Species

Federal Species of Concern

Under the Endangered Species Act (ESA) of 1973 (as amended), threatened and endangered species include those species or subspecies that may become endangered (threatened) or are in danger of extinction (endangered) due to drastic population declines. Candidate species are plants and animals for which the USFWS has sufficient information on their biological status and threats to propose them as endangered or threatened under the ESA, but for which development of a proposed listing regulation is precluded by other higher priority listing activities. Plant species listed as threatened, endangered, or candidate that may occur within the counties included in the Project study area include Knowlton's cactus (*Pediocactus knowltonii*), Mancos milkvetch (*Astragalus humiilimus*), Mesa Verde cactus (*Sclerocactus mesaeverde*), rhizome fleabane (*Erigeron rhizomatus*), sleeping Ute milkvetch (*Astragalus tortipes*), and the candidate Pagosa skyrocket (*Ipomopsis polyantha*).

Potential habitat for the endangered Knowlton's cactus is mapped around the Los Piños River in New Mexico and Colorado and is designated as exclusion for this MCS. Potential habitat for the endangered Mancos milkvetch and threatened Mesa Verde cactus is mapped as the Hogback ACEC near Shiprock. The majority of this ACEC was designated as an exclusion area except for adjacent to existing ROWs for the purpose of this MCS. No other federal flora species potential habitat areas are located within the Project study area.

BLM Sensitive Plant Species

The BLM Sensitive Aztec gilia (*Aliciella formosa*) and Brack's hardwall cactus (*Sclerocactus cloveriae* var. *brackii*) have potential habitat mapped on BLM lands throughout the central New Mexico portion of the Project study area (see Figure A-11). Both species occur on the Nacimiento Formation in salt desert scrub communities. Potential habitat was designated as avoidance areas for the MCS due to the extent of land mapped.

4.4.2 Wildlife

The Project study area includes habitat for a variety of terrestrial and aquatic species including various raptor species (bald eagle, golden eagle, prairie falcon), big game mammals (black bear, elk, mule deer, mountain lion), reptiles (rattlesnake, bull snake, western whiptail, sagebrush lizard), and fish (brown trout, suckers, and rainbow trout).

Habitats were included in the opportunity and constraints map based on the best available data. These habitats included bald eagle nest sites, communal roost sites, and winter concentration habitat; prairie dog colonies; mule deer and elk production areas, severe winter range, and migration corridors; peregrine falcon known nesting and potential nesting areas; other known raptor nests in New Mexico; and river otter overall range. Bald eagles, prairie dog colonies, raptors, and river otter are discussed further under Special Status Species.

Information pertaining to elk (*Cervus elaphus*) and mule deer (*Odocoileus hemionus*) habitat in the Colorado portion of the Project study area was provided by Colorado Division of Wildlife (CDOW) (2008) and the Southern Ute Indian Tribe (2008) and includes severe winter range, production areas, and migration corridors. The majority of elk and mule deer habitat within the Project study area occurs north of the Mesa Mountains in Colorado and in the valleys adjacent to the mountains. Severe winter range is the primary habitat for elk and mule deer within the Project study area, occurring in the northeastern portion of the study area, with another pocket of elk severe winter range in southwestern La Plata County. There are two large elk and mule deer production areas mapped along the Colorado-New Mexico border in western and central La Plata County, and a small elk migration corridor near Alamo and Beef Canyons in the Mesa Mountains area. The Colorado elk and mule deer habitat described above is shown in Figure A-11. Elk and mule deer production areas were designated as avoidance areas for purposes of the MCS.

Big game information for New Mexico was obtained from the BLM through review and summary of management prescriptions for SDAs designated for wildlife protection. These SDAs include, from west to east, Thomas Canyon, East La Plata, Rattlesnake Canyon, Middle Mesa, and Rosa Mesa. These areas are managed for protection of mule deer and, to a lesser extent, elk winter habitat through seasonal closures running from December 1 through March 31 for most areas, and November 1 through April 15 for the Thomas Canyon SDA. The majority of big game winter habitat in the Project study area in New Mexico occurs on the Rattlesnake Canyon SDA, comprising 11,000 acres between the Animas River and Navajo Reservoir. The New Mexico big game habitat described is shown in Figure A-11.

Known nesting and potential nesting habitat for the American peregrine falcon (*Falco peregrinus anatum*) is mapped in the northwestern portion of the Project study area in Colorado. The peregrine falcon is also BLM sensitive species and occurs in the Piñon Mesa SDA in New Mexico, west of the La Plata River (see Figure A-11). Peregrine falcon nest in rugged terrain with rocky cliffs and canyons usually from 30 to 100 feet high adjacent to rivers or lakes. Although the peregrine falcon was delisted in 1999, raptors are high interest species protected by multiple land management agencies. Therefore, the known nest sites in Mancos Canyon are mapped as exclusion areas.

4.4.2.1 Threatened, Endangered and Special Status Species

Federal Species of Concern

Wildlife species listed as threatened, endangered, or candidate under the ESA that may occur within the counties included in the Project study area include Mexican spotted owl (*Strix occidentalis lucida*), southwestern willow flycatcher (*Empidonax traillii extimus*), the candidate yellow-billed cuckoo (*Coccyzus americanus*), black-footed ferret (*Mustela nigripes*), Canada lynx (*Lynx canadensis*), razorback sucker (*Xyrauchen texanus*), Colorado

pikeminnow (*Ptychocheilus lucius*), and Uncompahgre fritillary butterfly (*Boloria acrocnema*).

Electronic habitat data for several of these listed species were not available at the time this MCS was completed. Although potential habitat is not mapped, breeding habitat for the southwestern willow flycatcher is characterized by dense, shrubby riparian habitats in close proximity to water or saturated soil, and this species is known to occur on portions of the Los Piños, La Plata and San Juan Rivers. USFWS designated critical habitat for the Colorado pikeminnow occurs in the San Juan River south of Shiprock and east to Farmington, New Mexico. No other mapped habitat for federally listed wildlife species occurs in the Project study area. Habitat and occurrences of listed species will be assessed in greater detail in future phases of route selection, once alternative alignments have been selected. Tri-State will work with CDOW, New Mexico Department of Game and Fish (NMDGF), and USFWS throughout the routing process to minimize impacts on threatened and endangered species and their habitats.

BLM Sensitive Wildlife Species

The BLM provided known raptor nest buffers on their lands for the BLM sensitive prairie falcon (*Falco mexicanus*) and golden eagle (*Aquila chrysaetos*) (2007). Seasonal restrictions and distance buffers apply to raptor nests; buffer sizes are species dependent. To protect breeding habitat for raptors, historic nest buffers were designated as exclusion areas. Raptors often use alternate nest sites within historic ranges and don't necessarily use the same nest site every year. Therefore, once alternative routes are selected, raptor surveys would be conducted and raptor activity would be mapped in relation to the Project.

Prairie dog colony locations on BLM lands were obtained from 2003 through 2006 (see Figure A-11). Prairie dog colonies provide habitat for several BLM sensitive species including burrowing owl (*Athene cunicularia*), mountain plover (*Charadrius montanus*), ferruginous hawk (*Buteo regalis*), and the federally endangered black-footed ferret. Due to the importance as habitat for these species, prairie dog colonies were mapped as exclusion areas.

State Species of Concern

CDOW is responsible for enforcement of the state threatened and endangered species statute in Colorado while NMDGF enforces the New Mexico Wildlife Conservation Act. Many of the species on state lists are also protected at the federal level. Information on the Colorado and New Mexico state-threatened bald eagle (*Haliaeetus leucocephalus*) and Colorado threatened river otter (*Lontra canadensis*) were included in the MCS because existing data were readily available.

Bald Eagle

The bald eagle was de-listed from the ESA on August 8, 2007, but is still federally protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. The bald eagle is also protected under Colorado's Threatened and Endangered Species statute and New Mexico's Wildlife Conservation Act. The bald eagle inhabits suitable habitat near reservoirs and rivers. CDOW (2008) provided information on bald eagle habitat in the Project study area in Colorado while BLM provided ACECs in New Mexico. Within the Project study area, bald eagle roost sites and nest sites as well as winter concentration areas are

known to occur. Areas within 0.5 mile of nest and roost sites should be avoided to the greatest extent possible.

In Colorado, winter concentration areas for bald eagles include the Mancos River, La Plata River, Animas River, San Juan River, and the Los Piños River corridors. There are several bald eagle roost and nest sites within the Project study area located along the La Plata River and the San Juan River. The BLM has sixteen ACECs designated for bald eagle protection in New Mexico including Animas River Tracts 1 through 8, Archuleta River Tract, Dick Earl Canyon, Frances 5 and 6, Negro Canyon, and Pine 1 through 3. Navajo Lake has a large number of winter concentration areas for eagles. Management prescriptions for these ACECs include no ROWs in core areas and seasonal construction restrictions from November 1 through March 31. These habitats are shown in Figure A-11. Areas within 0.50 mile of a bald eagle nest or communal roost site were designated as exclusion areas and will be avoided during routing to the greatest extent feasible. Winter concentration areas would also be avoided to the greatest extent feasible.

Aquatic Species

In Colorado, the state-threatened river otter's overall range includes the Los Piños River. River otters are semi-aquatic members of the weasel family and were reintroduced to the state in the 1970s. The New Mexico endangered roundtail chub (*Gila robusta*) is also known to occur in the mainstem of the San Juan River as well as the Animas River. The Los Piños and Animas Rivers were designated as avoidance areas and will be avoided during routing to the greatest extent feasible.

During the future phases of the route selection process, additional information will be collected regarding federally listed, state listed, and BLM sensitive species.

4.5 GEOLOGIC RESOURCES

The majority (89.1%) of the Project study area is composed of sedimentary rock from the tertiary and cretaceous periods. Almost all of the remainder (10.9%) is composed of alluvial gravels of the quarternary period. These are located primarily along the major river corridors (Animas, Florida, La Plata, Los Piños, Mancos, and San Juan Rivers, and some alluvial mesas (Red Mesa, Florida Mesa). There is also a small area (200 acres) of igneous intrusions from the tertiary period in the Mancos River canyon. The primary salable mineral resources associated with these formations are sand and gravel in the quarternary alluvials and coal in the Animas, Fruitland and Menefee formations. Oil and gas wells occur throughout the Project study area, particularly within the Fruitland coal formation, which is the primary producer of coal-bed methane within the San Juan Basin. Geologic hazards include shallow groundwater in the Animas formation and along major river corridors. Flooding can occur seasonally in response to snowmelt along the major unregulated river corridors draining from the north, and intermittently in response to summer thunderstorms or extreme rainfall events in intermittent drainages throughout the Project study area. Subsidence and methane seeps are associated with outcrop areas for coal bearing formations. All of the sedimentary formations are subject to shallow bedrock, debris flows, steep slopes, and problems associated with shale (weak bedrock, erodibility, and expansion). Table 2 provides a summary of primary rock components, associated geologic hazards and mineral resources.

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Table 2. Geologic units in the San Juan Basin Energy Connect Project area with primary rock components, associated geologic hazards, and mineral resources.

Symbol	Formation	Description	Geologic Hazards										mineral resources
			shallow GW	flooding	sub-sidence	shallow BR	debris-mudflows	PUS slopes >50%	methane seeps	shale - erodible	shale - expansive	shale - weak	
Qa, Qg, Qgo, Qd	Quartenary gravels	C&M, S&G	x	X				x					S&G
Tsj	San Jose	S&G, CON, SS, SH				x	x	x		x	x	x	gravel
Tmi	Middle Teriary Intrusive	II (vertical dikes)				x							
Tn	Nacimiento	SH, mudstone, SS, CON-SS, lignite				x	x	x		x	x	x	
Tka	Animas	SH, SS, CON, coaly mudstone	x		x	x	x	x	x	x	x	x	minor coal
Toa	Ojo Alamo Sandstone	CON-SS, some siltstone & mudstonel				x	x	x		x	x	x	
Kkf	Kirtland Shale and Fruitland	SH, SS, CON, shale, siltstone, mudstone, coal			x	x	x	x	x	x	x	x	coal
Kpc	Pictured Cliffs Sandstone	SS, SH, siltstone				x	x	x		x	x	x	
Kls	Lewis Shale	SH, LS, thin SS, bentonite					x	x		x	x	x	
Kpcl	Pictured Cliffs and Lewis Shale	SS, SH, LS, siltstone, bentonite				x	x	x		x	x	x	
Kch	Cliff House Sandstone	SS, interbedded thin SH & siltstone				x	x	x		x	x	x	
Kmf	Menefee	SS, SH, LS, siltstone, coal			x	x	x	x	x	x	x	x	coal
Kpl	Point Lookout Sandstone	SS, lesser SH				x	x	x		x	x	x	
Kmp	Menefee and Point Lookout Sandstone	SS, SH, LS, siltstone, coal			x	x	x	x	x	x	x	x	coal
Km	Mancos Shale	SH, some SS, LS					x	x		x	x	x	

Key: C&M = clay and silt
CON = conglomerate
II = igneous intrusive
LS = limestone
S&G = sand and gravel
SH = shale
SM = siltstone
SS = sandstone

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4.5.1 Mineral Resources

The San Juan Basin is one of the largest natural gas fields in the lower 48 states. The Project study area encompasses the northwest section of the San Juan Basin in New Mexico and Colorado. There are 3,604 oil and gas wells in the Colorado portion of the Project study area and 8,244 oil and gas wells in the New Mexico portion. The majority of these are to the east of the Fruitland outcrop. Well pads are generally located near the center of each quarter-section due to location restrictions from state agencies. Pipelines for collecting and distributing natural gas occur throughout the area. Compressor stations occur throughout the area, but GIS data of their locations are not publicly available. Constraints and opportunities associated with well pads and compressor stations are discussed in Section 4.1.6. Opportunities and constraints associated with pipelines are discussed in Section 4.2.2.

Figure A-6 shows the location of surface mine throughout the Project study area. There are 63 designated surface mines in Colorado; 43 in New Mexico. The surface mines in Colorado (58 total) consist primarily of sand/gravel/construction borrow material. The other Colorado surface mines include one coal mine, one sodium mine, and three with a designation of "unknown". New Mexico data did not provide a breakdown of the types of surface mines. The area within 500 feet of surface mine boundaries were designated as avoidance areas.

The area within the San Juan Coal Mine permit boundary is a potential subsidence area. The San Juan Coal company will work with Tri-State to determine the optimal routing to manage planned subsidence areas within the mine lease area.

4.5.2 Slope

Slope was identified and mapped using the USGS National Elevation Dataset 30-meter Digital Elevation Model and the Spatial Analyst extension in ArcGIS 9.1. As shown in Figure A-12, the majority of the Project study area contains slope of less than 25%; with slopes greater than 25% present in the mountainous areas.

Slope may be classified as either an opportunity or a constraint depending on its degree and orientation. Opportunities associated with slope exist where landforms provide visual screening of the transmission line. In contrast, steep terrain is typically avoided or excluded during routing because constructing a transmission line and access roads on steep slopes could require complex engineering and may result in greater potential environmental impacts. For this preliminary analysis of routing opportunities, slope data greater than 25% was included as avoidance area in the opportunities and constraints model.

4.6 CULTURAL AND HISTORIC RESOURCES

There are 10 prohibitive cultural resource areas identified by agencies in the Project study area (Table 3). Several of the large sites designated as prohibitive also qualify as Traditional Cultural Places, as their significance to Native Americans continues to the present day. Detailed site record searches on New Mexico and Colorado databases (Class I Cultural Survey) were not initiated during this phase due to the size of the Project area, but will be completed after selection of alternative routes. Likewise, the identification of high site density zones was not considered here as the entire study area lies within one of the

most archaeologically rich regions of the United States, particularly well known for successive Archaic, Ancestral Pueblo, and Navajo occupations.

Table 3. Prohibitive cultural resource constraints in the analysis area.

No.	Cultural Resource Identification	Description	State	Land Status
1	Vicinity of Hart Mountain	Traditional Cultural Place	NM	BLMFFO and NM State
2	Vicinity of Piñon Mesa	Traditional Cultural Place	NM	BLMFFO, NM State, Private
3	Morris 41 ACEC	Ancestral Pueblo Chacoan Outlier Community (Pueblo II, ca. AD 900-1100)/ Traditional Cultural Place	NM	BLMFFO
4	Holmes Group ACEC	Ancestral Pueblo Chacoan Outlier Community (Pueblo II period, ca. AD 900-1100)/ Traditional Cultural Place	NM	BLMFFO and Private
5	Cedar Hill ACEC	Ancestral Pueblo, Pueblo I Period (ca. AD 800-900) Community	NM	BLMFFO
6	East Side Rincon ACEC	Archaic to Early (BMIII-PI) Ancestral Pueblo (ca. 6000 BC to AD 900) Community	NM	BLMFFO and Private
7	Simon Ruin ACEC	Navajo Gobernador Phase Pueblito (ca. AD 1700-1780)/ Potential Traditional Cultural Place	NM	BLMFFO
8	Farmer's Arroyo ACEC	Mesa Verde Ancestral Pueblo Community, Mesa Verde phase (ca. AD 1200-1300)	NM	BLMFFO
9	Aztec Ruins National Monument	Ancestral Pueblo Chacoan Outlier Community (Pueblo II, ca. AD 900-1100)/ Traditional Cultural Place	NM	NPS
10	Gem Village Cultural Resource Area	Early Ancestral Pueblo Community (Basketmaker III to Pueblo I periods, ca. AD 500 to 900)	CO	BLMSJRA

The proximity of the analysis area to major prehistoric occupations in MVNP, Ute Mountain Ute Tribal Park, the La Plata River Valley, various Chacoan outliers, and the Dinétah (Navajo homeland from late prehistoric to early historic times) suggests the analysis area is probably characterized by moderate to high archaeological site densities throughout. Furthermore, as less than 10% of the analysis area has been intensively surveyed for cultural resources, demarcating high site density zones based on known records could be misleading by merely reflecting zones of active industrial-commercial development, such as natural gas and oil fields, where cultural resource inventories and permitting are required. Adjacent areas lacking previously recorded sites have probably never been subject to intensive cultural resource surveys, though they likely contain ample and significant cultural resources.

There are approximately 20 National Register of Historic Places sites located within the Project study area. The majority of the sites are located within the city limits of Aztec, NM, with one site in Farmington, NM. This information was collected from the National Register of Historic Places spatial database. The complete citation can be found in Section 8.0.

Areas within 100 feet of historic districts and regions were designated as exclusion. During routing, areas within 0.125 miles of historic sites will be avoided to the extent feasible.

5.0 CORRIDOR IDENTIFICATION

Identification of the alternative corridors is a detailed process that includes reviewing resource data, identifying routing opportunities and constraints, and consulting with local jurisdictions and public agencies. The opportunities and constraints analysis map was used to identify a number of preliminary alternative corridors as shown in Figure 3. The corridors were divided into segments that begin and end at logical termini or where one segment branches off from another segment. A description of each of the segments is presented below in Table 4.

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Table 4. Corridor segments identified.

Segment	Opportunity Along Existing Transportation Corridor	Opportunity Along Existing Transmission Line	Opportunity Along Existing Pipeline	General Description	Special Considerations[1]
A	1.5 miles of southern portion of segment parallels U.S. Highway 64	Along FEUS 115 kV transmission line		8.6 miles; low elevation shrubland, grassland and disturbed land; private, state, and BLM lands	Crosses San Juan Coal Mine Lease Area; occurs within the Hogback ACEC (threatened and endangered [T&E] plants); small portion of segment crosses into Colorado pikeminnow critical habitat (San Juan River); there are surface mines located within this segment
B		Along FEUS 115 kV transmission line		2.8 miles; low elevation shrubland and grassland ; BLM land	Occurs in Hogback ACEC (T&E plants)
C		Along FEUS 115 kV transmission line		4.6 miles; low elevation shrubland, grassland, disturbed land; private, state, and BLM lands	Crosses San Juan Coal Mine Lease Area; there are surface mines located within this segment.
D	Follows CR 6480 and CR 1980	Along FEUS 115 kV transmission line		15.2 miles; piñon juniper, low elevation rock and sand, low elevation shrubland; private, state, and BLM lands	Crosses La Plata River and La Plata #8 ACEC (River tract); crosses through City of Farmington municipal boundary; crosses Four Corners Regional Airport Boundary
E		Along Tri State/Western 345 kV transmission line		13.8 miles; piñon juniper, low elevation rock and sand, low elevation shrubland; private, state, and BLM lands	Parallels Ute Mountain Ute Reservation southern border, crosses Piñon Mesa TCP, crosses San Juan Coal Mine Lease Area; there is a surface mines located within this segment
F		Along Tri-State/Western 345 kV transmission line		4.7 miles; piñon juniper and shrubland; private, state, and BLM lands	Crosses La Plata #4 and #5 ACECs (river tract), agricultural lands, BLM sensitive plant potential habitat
G	Follows CR 1191 and SH 574 and 170	Along section of FEUS 115 kV transmission line to La Plata Mine		13.3 miles; piñon juniper low elevation shrub land and agriculture; private, state, and BLM lands	High home density along CR 1191; crosses BLM sensitive plant potential habitat, Holmes Group ACEC (cultural) and farmland; crosses the La Plata River; there are surface mines located within this segment
H	Follows existing oil and gas access roads	Along FEUS 115 kV and Tri-State/Western 345 kV transmission lines		5.5 miles; piñon juniper and sagebrush; private, state, and BLM lands	Utility corridor with existing multiple lines; crosses BLM sensitive plant potential habitat; no homes within buffered segment; BLM Specially Designated Recreational Area
I	Follows existing oil and gas access roads	Along FEUS 115 kV and Tri-State/Western 345 kV transmission lines		7.0 miles; piñon juniper and sagebrush; private, state, and BLM lands	Utility corridor with existing multiple lines; crosses BLM sensitive plant potential habitat; no homes within buffered segment
J	Follows existing oil and gas access roads	Along FEUS 115 kV transmission line		10.5 miles; piñon juniper, sagebrush, low elevation rock and sand, agriculture; private, state, and BLM lands	Crosses Animas River, associated farmland and residential areas, Animas River Tract #8 ACEC, and BLM sensitive plant potential habitat; a campground is located in the southeastern portion of the segment
K	Follows U.S. Highway 550 corridor			8.6 miles; agriculture, piñon juniper, low elevation shrubland, riparian; private, state, and BLM lands	Crosses Animas River tracts #1, #4 and #6 ACECs; agriculture lands; moderate home density; and oil and gas wells; adjacent to wildlife SDA for big game wintering; there is a surface mine located within this segment
L	Follows CR 2770	Partially along FEUS 115 kV transmission line		5.7 miles; piñon juniper, sagebrush, agriculture; private and BLM land	BLM sensitive plant potential habitat; borders wildlife SDA for big game wintering; farmland; high oil and gas well density
M	Follows oil and gas access roads		Follows major oil and gas pipeline route	10.6 miles; piñon juniper; private, state, and BLM lands	Crosses wildlife SDA for big game wintering; high density oil and gas wells
N	Partially follows State Highway 511		Parallels portions of a major oil and gas pipeline route	16.7 miles; piñon juniper, sagebrush, ponderosa pine; private, state, and BLM lands	Pump Canyon crossing steep slopes; crosses wildlife SDA for big game wintering and Reese Canyon Research Natural area (T&E plant); high density oil and gas wells

Segment	Opportunity Along Existing Transportation Corridor	Opportunity Along Existing Transmission Line	Opportunity Along Existing Pipeline	General Description	Special Considerations[1]
O				6.2 miles; piñon juniper, ponderosa pine, sagebrush; SUIT, BLM, private	Parallels state lines; borders wildlife SDA for big game wintering; crosses elk migration corridor; crosses Pump Canyon steep slopes; moderate density oil and gas wells
P			Parallels major oil and gas pipeline	9.8 miles; piñon juniper; SUIT and private	Crosses elk and mule deer production area; cluster of FCC towers located in northeastern portion of the segment
Q				9.7 miles; piñon juniper; SUIT, private, BLM	Parallels state lines; provides river crossing opportunity through narrow river canyon; crosses elk and mule deer production area; no homes and moderately high oil and gas well density
R	Follows oil and gas access roads			5.0 miles; piñon juniper, riparian; SUIT and private	Crosses southern portion of Gaines Canyon PCA; bald eagle winter concentration habitat along Animas River; crosses Animas River via Animas River Canyon- steep slopes; provides river crossing opportunity through narrow river canyon; elk and mule deer severe winter habitat along Animas river; no homes
S		Along Tri-State/Western 345 kV transmission line		4.6 miles; piñon juniper, sagebrush; SUIT lands	Crosses elk and mule deer production area; no homes; moderate oil and gas well density
T			Follows major oil and gas pipeline route	8.8 miles; piñon juniper and ponderosa pine; private and SUIT	Steep slopes; crosses elk and mule deer production area; low oil and gas well density; several FCC towers located within central portion of segment
U	Parallels CR 310, then follows major oil and gas pipeline corridor.		Partially follows major oil and gas pipeline corridor	5.5 miles; agricultural, piñon juniper, and riparian; SUIT and private	Crosses the Animas River – steep slopes on eastern side, western side consists of riparian and farmland; crosses elk and mule deer severe winter range, bald eagle concentration area, and Gaines Canyon and Bondad PCAs; homes in segment
V		Along Tri-State/Western 345 kV and LPEA 115 kV transmission lines		29.7 miles; piñon juniper, sagebrush, oak shrubland, agriculture, ponderosa pine; private and SUIT	Crosses methane seep restriction area; steep slopes along segment; crosses Animas and Florida rivers with designated bald eagle winter concentration areas; crosses elk and mule deer severe winter range; crosses agricultural lands and a subdivision (subdivision lands are an exclusion; however, in this case the segment follows an existing power line and is located outside or along the edge of the actual subdivision boundary); crosses Animas River at La Posta PCA; crosses Durango La Plata airport lands (airport approach/departure runways are an exclusion; however, in this case the existing power line follows the Florida River valley and is geographically below the actual glide path – further investigation of this segment and its relationship to the runways will need to be conducted in additional analysis).
W	Follows oil and gas access roads		Follows major oil and gas pipeline;	3.6 miles; piñon juniper, sagebrush, and ponderosa pine; SUIT	Cluster of FCC towers on northern end of segment; moderately high oil and gas well density and no homes
X	Follows oil and gas access roads		Follows major oil and oil gas pipeline;	2.3 miles; piñon juniper, ponderosa pine; SUIT	Steep slopes; cluster of FCC towers at eastern end of segment
Y	Follows oil and gas access roads		Follows major oil and gas pipeline;	5.1 miles; piñon juniper, sagebrush, ponderosa pine, oak shrubland; SUIT	No homes; low oil and gas well density
Z			Follows major oil and gas pipeline	2.7 miles; piñon juniper oak shrubland, ponderosa pine; SUIT	
AA				3.0 miles; agriculture, low elevation shrubland, piñon juniper, and sagebrush; private and SUIT	No homes; moderately high oil and gas well density; crosses elk and mule deer severe winter range

Segment	Opportunity Along Existing Transportation Corridor	Opportunity Along Existing Transmission Line	Opportunity Along Existing Pipeline	General Description	Special Considerations[1]
BB		Parallels LPEA 115 kV transmission line		2.9 miles; primarily agriculture, sagebrush, piñon juniper; private and SUIT	Moderate home density and moderately high oil and gas well density; within elk and mule deer severe winter range
CC	Parallels CR 318		An oil and gas pipeline occurs in the eastern half of the segment	3.9 miles; piñon juniper, low elevation shrubland, sagebrush, agriculture; private and SUIT	Occurs in elk and mule deer severe winter range; the segment also contains two subdivisions (subdivision lands are an exclusion; however, in this case the segment follows an existing road and the subdivisions occur in a portion of the southern half of the segment).
DD	Parallels CR 311			4.1 miles; piñon juniper, low elevation shrubland, sagebrush, and agriculture; private	Within elk and mule deer severe winter range; very high density of homes and oil and gas wells in segment
EE			Parallels major oil and gas pipeline	4.6 miles; piñon juniper, oak shrubland and ponderosa pine; private and SUIT	Low density homes and very high density of oil and gas wells in segment
FF	North south segment parallels CR 319		East-west portion of the segment parallels a major oil and gas pipeline	6.4 miles; piñon juniper, low elevation shrubland, ponderosa pine, and agriculture; private and SUIT	A portion of the segment occurs in elk and mule deer severe winter range; very high density or oil and gas wells in segment
GG		Parallels PNM transmission line		7.9 miles; low elevation shrubland, low elevation rock and sand, grassland/forbland, piñon juniper; private, BLM, and state	Crosses San Juan Coal Mine Lease Area; there is a surface mine located within this segment; low well density
HH		Parallels PNM transmission line		1.3 miles; low elevation shrubland, grassland/forbland, developed; BLM	Crosses San Juan Coal Mine Lease Area; there are surface mines located within this segment; low well density
II				5.2 miles; agriculture and piñon juniper; BLM and SUIT	Segment occurs in the Rattlesnake Canyon Big Game area, elk and mule deer severe winter range, bald eagle winter concentration area and Animas River Tract #1; segment crosses Animas River; low house density and moderate well density; there are areas with a greater than 25% slope
JJ				1.1 miles; piñon juniper, riparian; private, SUIT	Elk and mule deer severe winter range, bald eagle winter concentration area. Moderate house and well density; along Animas River; areas with a greater than 25% slope.

[1] Raptor nest locations and BLM sensitive plant potential habitat were not included in the segment analysis since site specific surveys would be conducted once alternatives are chosen. All SDAs are not included in the segment analysis since protection levels vary.

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6.0 FUTURE TASKS

6.1 ROUTE IDENTIFICATION AND COMPARATIVE ANALYSIS

The corridors identified through this MCS process will be shared with the public at a first round of public meetings to solicit input on the corridors, siting criteria, area resources, concerns, etc. The corridors will also be shared with interested and/or involved agencies for input. Impact assessment combined with public and agency input will be used to identify specific alternative routes within each of the corridors (Phase 5 of the siting process). This allows for the quantification of Project-related impacts associated with each route alternative. Potential routes that are identified will need to meet the Project objectives, which require that the routes:

- connect both substations, and intermediate substations;
- maximize opportunities and minimize constraints and avoidance areas through more detailed analysis; and
- are cost-effective.

The route refinement process will involve quantification and comparison of the environmental consequences that are expected as a result of implementation of the Project. Potential routes will be analyzed on a segment-by-segment basis using routing criteria developed through the public/agency consultation process. These criteria will expand upon the opportunity and constraints criteria used to identify preliminary corridors. For each of the routing criteria, segment impacts will be quantified to allow for easy comparison. Impacts associated with each of the route alternatives will then be totaled and a rank will be assigned to each route alternative with 1 representing the least impact and a higher number (depending on the number of alternatives considered) representing the most impact. An alternative's ranking will reflect the relative impact that a given route alternative has on resources compared to the impacts of the other alternatives. The total gives a relative indication of the overall impact each route alternative would have on the surrounding environment.

6.2 FIELD RECONNAISSANCE AND IDENTIFICATION OF ROUTE-SPECIFIC CONSTRAINTS

Field reconnaissance will be conducted on the ground and by helicopter, if necessary, during the resource quantification and the route refinement process. Ultimately, a preferred and at least one alternative route will be selected for further analysis. These routes will be presented in a second series of public meetings and will be analyzed in detail during the NEPA process (See Section 6.5). The routes that are carried forward for final analysis will represent a rational balance between the need for reliable electric service, with potential environmental impacts, public acceptance, engineering considerations, economics, regulatory requirements, and land use.

Additional route-specific constraints will include identifying and mapping floodplains and specific information on soils that could influence routing decisions. In addition, as the process continues, surveys for threatened and endangered species, as well as cultural resource surveys will need to be conducted.

6.3 PUBLIC AND STAKEHOLDER INVOLVEMENT

Public and stakeholder involvement and Project communication will be integral to the evaluation of the identified corridors, the identification and refinement of routes, and the selection of a preferred and an alternative route for detailed environmental analysis. Information regarding the Project will be available on Tri-State's website (www.tristategt.org) and will be updated as progress occurs.

An expanded public involvement process will include public scoping workshops that will begin the formal NEPA process. At these workshops, hosted jointly by the BIA and the BLM, Tri-State will present the preliminary corridors and routes to the public and solicit input regarding issues of concern.

This will assist in refining those alternatives as well as determining the level of analysis necessary to address the issues relevant to the proposed Project alternatives. Public input will continue to be a part of the Project through the NEPA process and the development of the NEPA document for the Project.

Stakeholders are those people and organizations that may be affected or have some interest in the Project. Potential stakeholders for this Project identified to date include the following entities:

- Businesses, residents, and property owners along the identified corridors
- U.S. Representative John Salazar (Colorado), U.S. Representative Ben Lujan (New Mexico)
- Colorado State Senator Jim Isgar (District 6)
- Colorado State House Representative Ellen Roberts (District 59)
- New Mexico State Senators – District 1, 2, and 3
- New Mexico State House Representatives – Districts 1, 3, and 4
- Montezuma and La Plata counties, Colorado
- San Juan County, New Mexico
- Colorado Cities of Durango and Ignacio
- New Mexico Cities of Farmington and Aztec
- Bureau of Indian Affairs
- BLM
- SUIT
- USFWS
- CDOW
- CDOT
- Homeowners' Associations

Notification of public meetings will be sent to stakeholders and will be posted in local news media prior to the meetings. An email newsletter may also be developed for the Project that will be sent to officials of these key organizations and other interested individuals with Project updates and background information.

6.4 PERMIT APPLICATIONS

In Colorado, Tri-State will work with the La Plata County Planning Department to submit a county application that demonstrates compliance with local land use planning policy and regulations. Transmission line projects with line voltage greater than 46 kV require a Class II Land Use Permit as specified in the La Plata County Land Use Code. The permit application will contain general Project information, such as a description of the Project, Project maps and graphics, construction methods and timing, and discussion of pertinent resources potentially affected by the Project and measures to minimize effects. The application will also include an Environmental Impact Assessment Report as required in Section 74-153 of the land use code. The application will be accompanied by one or more meetings with the county, generally including a presentation and discussion during a county planning commission or board of commissioners meeting. These meetings will provide the public with additional opportunities to comment on the Project.

In New Mexico, no official county permitting process applies to transmission line projects, but coordination with San Juan County will take place as appropriate. In addition, if this Project is subject to requirements of the New Mexico Public Regulation Commission, the appropriate process will be followed in order to comply with such requirements.

6.5 NEPA PROCESS

As part of the environmental review for the Project, it is expected that an Environmental Assessment (EA) will be prepared for this Project. The EA will be prepared in accordance with NEPA, Council on Environmental Quality implementing guidelines, BLM NEPA Handbook (H-1790-1) and Rural Utility Service (RUS) Bulletins 1794A-601 and 1794A-603. Specifically, the EA will include descriptions of the Project, the need for the Project, alternatives evaluated, the affected natural and human environments, potential environmental impacts, and recommended measures to mitigate anticipated impacts. Public scoping meetings are expected to be held at the beginning of the NEPA process and continued outreach to Project stakeholders will occur as part of the EA process. Public comments received will be considered as part of the EA analysis, including recommendations for short- and long-term Project mitigation.

7.0 MEETINGS AND CONSULTATIONS HELD TO DATE

To date, meetings have been held with involved agencies and major stakeholders including BLM, RUS, BIA and the SUIT to initiate their involvement in the Project and the upcoming NEPA process.

8.0 REFERENCES CITED

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FIGURES 1, 2 AND 3– COMPOSITE

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FIGURE A-1. LAND USE/ LAND COVER

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FIGURE A-2. COUNTY AND TRIBAL LAND USE

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FIGURE A-9. TOPOGRAPHY AND HYDROLOGY

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FIGURE A-12. SLOPE

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APPENDIX A – RESOURCE FIGURES

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Tri-State Generation & Transmission Association, Inc.

San Juan Basin Energy Connect

Figure A-1: Land Use/Land Cover

La Plata and Montezuma Counties, Colorado and San Juan County, New Mexico

Land Use / Land Cover (NLCDS)

- Open Water
- Developed, Open Space
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed, High Intensity
- Barren Land
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Scrub/Shrub
- Grassland/Herbaceous
- Pasture/Hay
- Emergent Herbaceous Wetlands
- Cultivated Crops
- Woody Wetlands

Hydrology (Medium Resolution NHD)

- Canals/ Ditches
- Perennial Streams

Electric Infrastructure

(Tri-State, LPEA, WAPA, FEUS)

- Transmission Lines
- Substation
- Proposed Substation

Sources:

USGS
National Land Cover Database

1:110,000

0 0.5 1 2 3 4 Miles

Map Projection: Universal Transverse Mercator Zone 13
Datum: North American 1983 (CONUS)

ECOSPHERE ENVIRONMENTAL SERVICES

TRI-STATE Generation and Transmission Association, Inc.

March 27, 2009 110K_LandCover_LandUse.mxd

Tri-State Generation & Transmission Association, Inc.

San Juan Basin Energy Connect

Figure A-2: County and Tribal Land Use

La Plata and Montezuma Counties, Colorado and San Juan County, New Mexico

La Plata County, CO
- Agricultural
- Commercial
- Residential
- Vacant Land
- Industrial
- Natural Resource
- SUIT Compact
- Unknown
- Subdivisions

San Juan County, NM
- Agricultural
- Commercial
- Exempt
- Residential
- Vacant Land

Southern Ute Indian Tribe
- Range lands
- Agriculture lands

Hydrology (Medium Resolution NHD)
- Canals / Ditches
- Perennial Streams
- Lake / Reservoir

Electric Infrastructure
(Tri-State, LPEA, WAPA, FEUS)
- Transmission Lines
- Substation
- Proposed Substation

Sources:

LA PLATA COUNTY
Colorado Tax Status
Colorado Subdivisions

SAN JUAN COUNTY
New Mexico Tax Status

SOUTHERN UTE INDIAN TRIBE
Range and Agricultural lands within tribal boundary

1:110,000

0 0.5 1 2 3 4 Miles

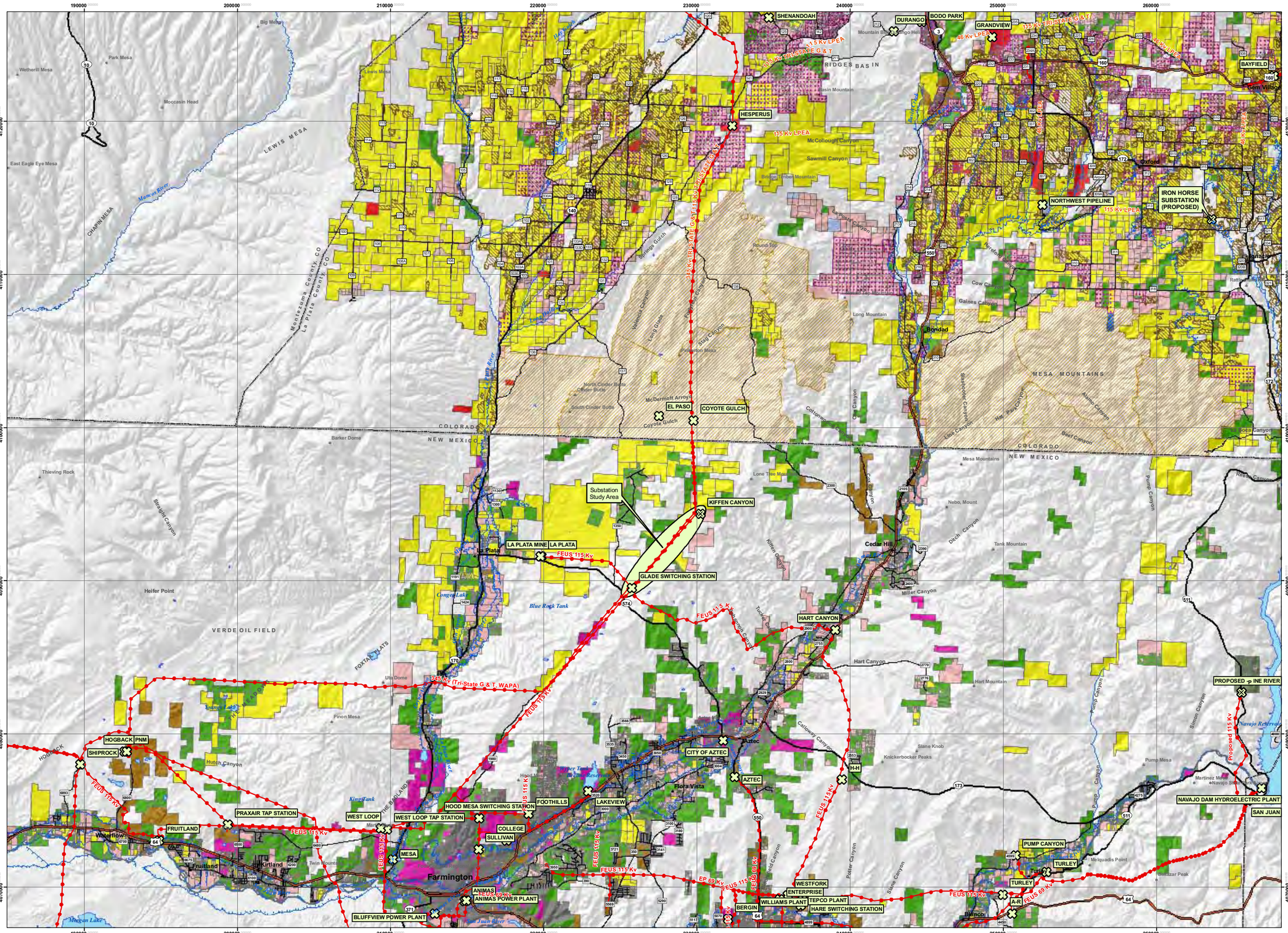
Map Projection: Universal Transverse Mercator Zone 13
Datum: North American 1983 (CONUS)

ECOSPHERE ENVIRONMENTAL SERVICES

TRI-STATE Generation and Transmission Association, Inc. A Touchstone Energy Cooperative

March 27, 2009

110k_Zoning.mxd



Tri-State Generation & Transmission Association, Inc.

San Juan Basin Energy Connect

Figure A-3: Land Jurisdiction

La Plata and Montezuma Counties, Colorado
and San Juan County, New Mexico

Land Jurisdiction
- Bureau of Land Management
- State Park / Bureau of Reclamation
- National Park
- State
- Private
- State Wildlife Area
- Municipal Boundaries

Ute Mountain Ute Tribe
- Ute Mountain Ute Reservation

Southern Ute Indian Tribe (SUIT)
- Southern Ute Reservation Boundary
- Southern Ute Tribal Trust Lands
- Southern Ute Alloted Land
- Recently Purchased Land
- Joint Interest Lands

Navajo Indian Tribe
- Navajo Tribal Trust Lands
- Navajo Allotted Land

Hydrology (Medium Resolution NHD)
- Canals / Ditches
- Perennial Streams
- Lake / Reservoir

Existing Electric Infrastructure
(Tri-State, LPEA, WAPA, FEUS)
- Transmission Lines
- Substation
- Proposed Substation

Sources:

BLM
Land status for non-tribal portions of Colorado and New Mexico and Ute Mountain Ute reservation
Public Land Survey System Grid

SOUTHERN UTE INDIAN TRIBE (SUIT)
Land status within SUIT boundary

NAVAJO INDIAN TRIBE
Land Status within Navajo Indian Reservation

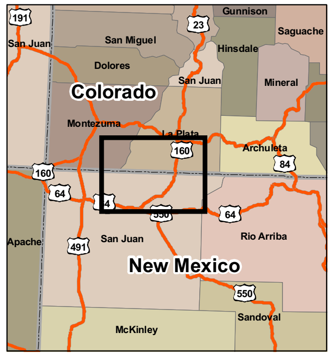
LA PLATA COUNTY
BOR Parcel south of Red Mesa
La Plata County Municipal Boundaries

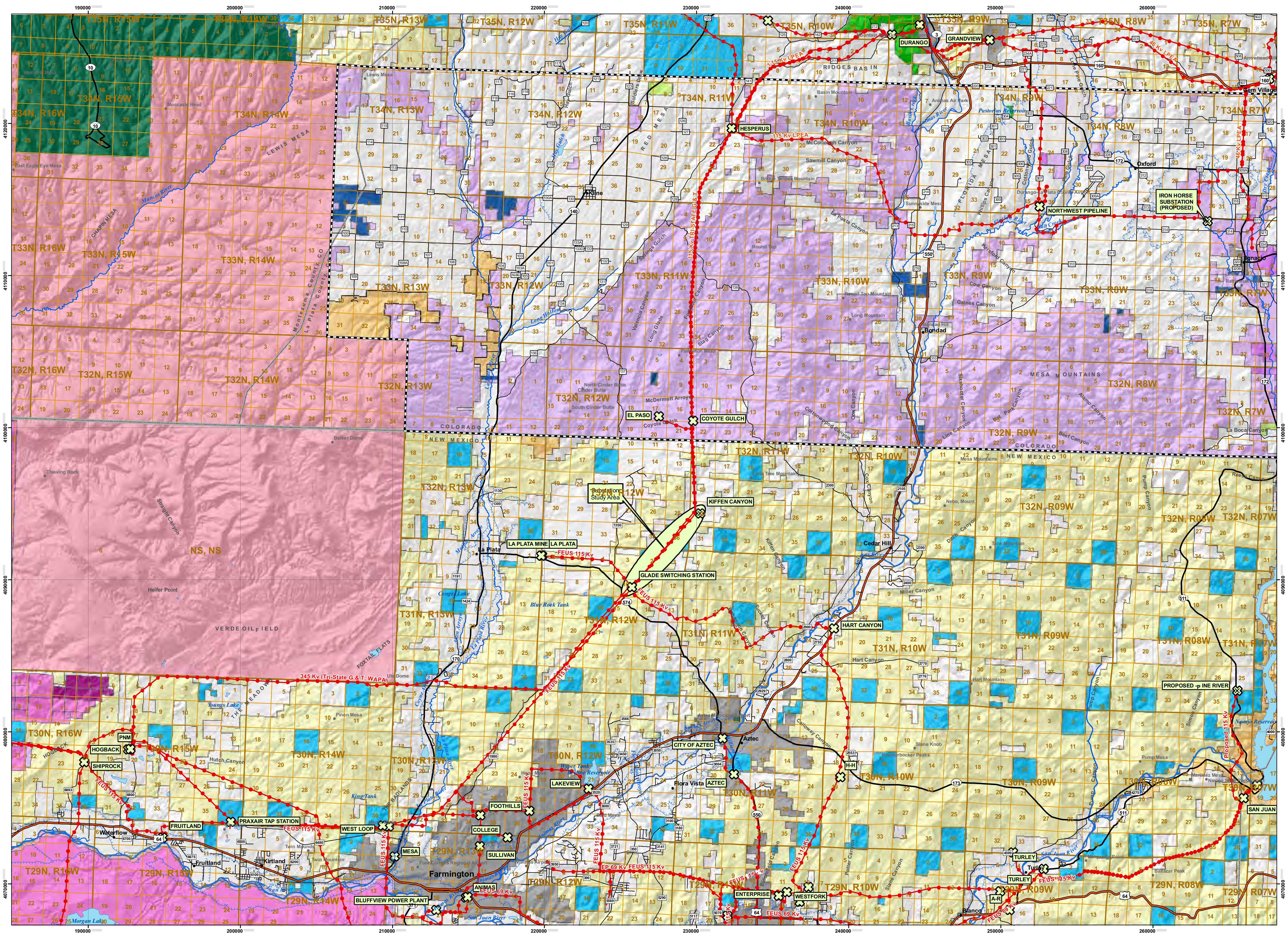
SAN JUAN COUNTY
San Juan County Municipal boundaries

1:110,000

0 0.5 1 2 3 4 Miles

Map Projection: Universal Transverse Metcator Zone 13
Datum: North American 1983 (CONUS)





March 27, 2009

110k_Land_Jurisdiction.mxd

ECOSPHERE ENVIRONMENTAL SERVICES

TRI-STATE Generation and Transmission Association, Inc.
A Touchstone Energy Cooperative

Tri-State Generation & Transmission Association, Inc.

San Juan Basin Energy Connect

Figure A-4: Agricultural Resources

La Plata and Montezuma Counties, Colorado and San Juan County, New Mexico

Prime Farmland
- Farmland of statewide importance
- Prime farmland if irrigated
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and protected from flooding
- Southern Ute Agricultural Land
- Irrigation Pivots

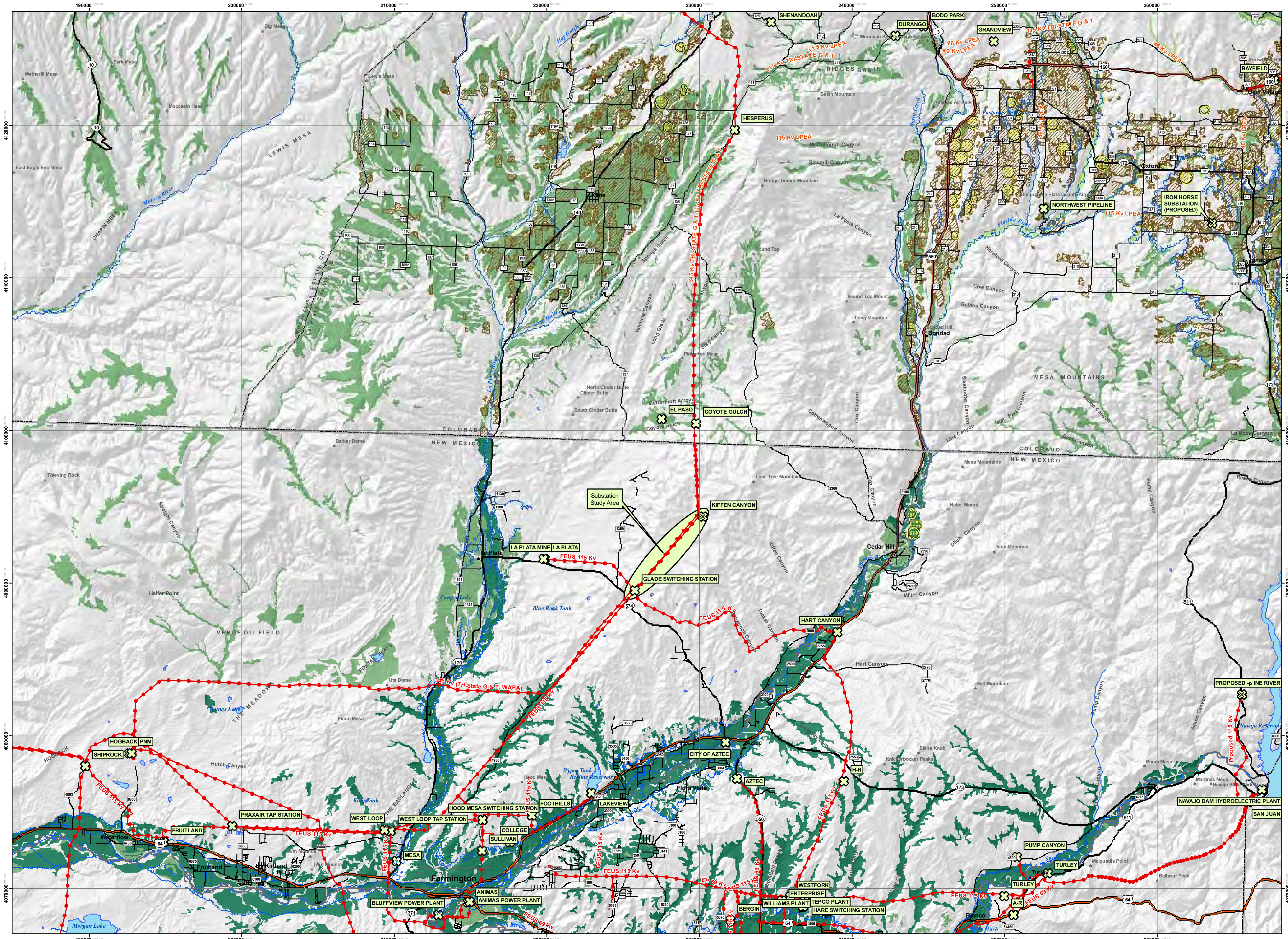
Hydrology (Medium Resolution NHD)
- Canals/ Ditches
- Perennial Streams
- Lake / Reservoir

Electric Infrastructure
(Tri-State, LPEA, WAPA, FEUS)
- Transmission Lines
- Substation
- Proposed Substation

Sources:

NRCS SSU RGO Soils Data
Prime Farmland

Southern Ute Indian Tribe
Agricultural Lands



Map Projection: Universal Transverse Metcator Zone 13
Datum: North American 1983 (CONUS)

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March 27, 2009 110k_Farmland.mxd

Tri-State Generation & Transmission Association, Inc.

San Juan Basin Energy Connect
Figure A-5: Public Use Facilities

La Plata and Montezuma Counties, Colorado and San Juan County, New Mexico

Public Use Areas
- Hospitals/Emergency Care
- Campgrounds
- Historic Site
- School (Outside Municipal Boundaries)
- Other Park
- Golf Course
- Cemetery
- Airport
- Pipeline
- FCC Communication Structure

Major Roads
- Federal Highways
- State Highways
- County
- Other

Hydrology (Medium Resolution NHD)
- Canals / Ditches
- Perennial Streams
- Lake / Reservoir

Existing Electric Infrastructure
(Tri-State, LPEA, WAPA, FEUS)
- Transmission Lines
- Substation
- Proposed Substation

Sources:

US CENSUS BUREAU
Hospitals, Parks, Golf Courses, Cemeteries
Montezuma county roads (TIGER line files)

WWW.WEBSBESTCAMPINGGUIDE.COM
Campgrounds

NATIONAL REGISTER OF HISTORIC PLACES
National Historic Sites

FAA
Airports

FCC
Antennas

LA PLATA COUNTY
Colorado Schools
La Plata county and secondary roads

SAN JUAN COUNTY
San Juan county and secondary roads

COLORADO GEOLOGIC SOCIETY
Colorado Pipelines

1:110,000

Miles
0 0.5 1 2 3 4

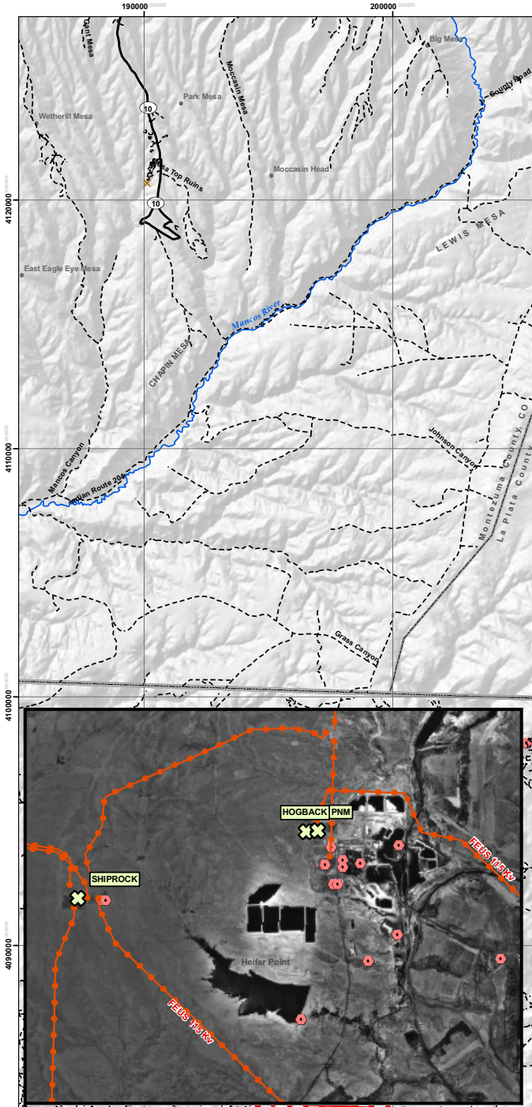
Map Projection: Universal Transverse Mercator Zone 13
Datum: North American 1983 (CONUS)

ECOSPHERE ENVIRONMENTAL SERVICES

TRI-STATE Generation and Transmission Association, Inc. — A Touchstone Energy Cooperative

March 27, 2009

110k_Human.mxd



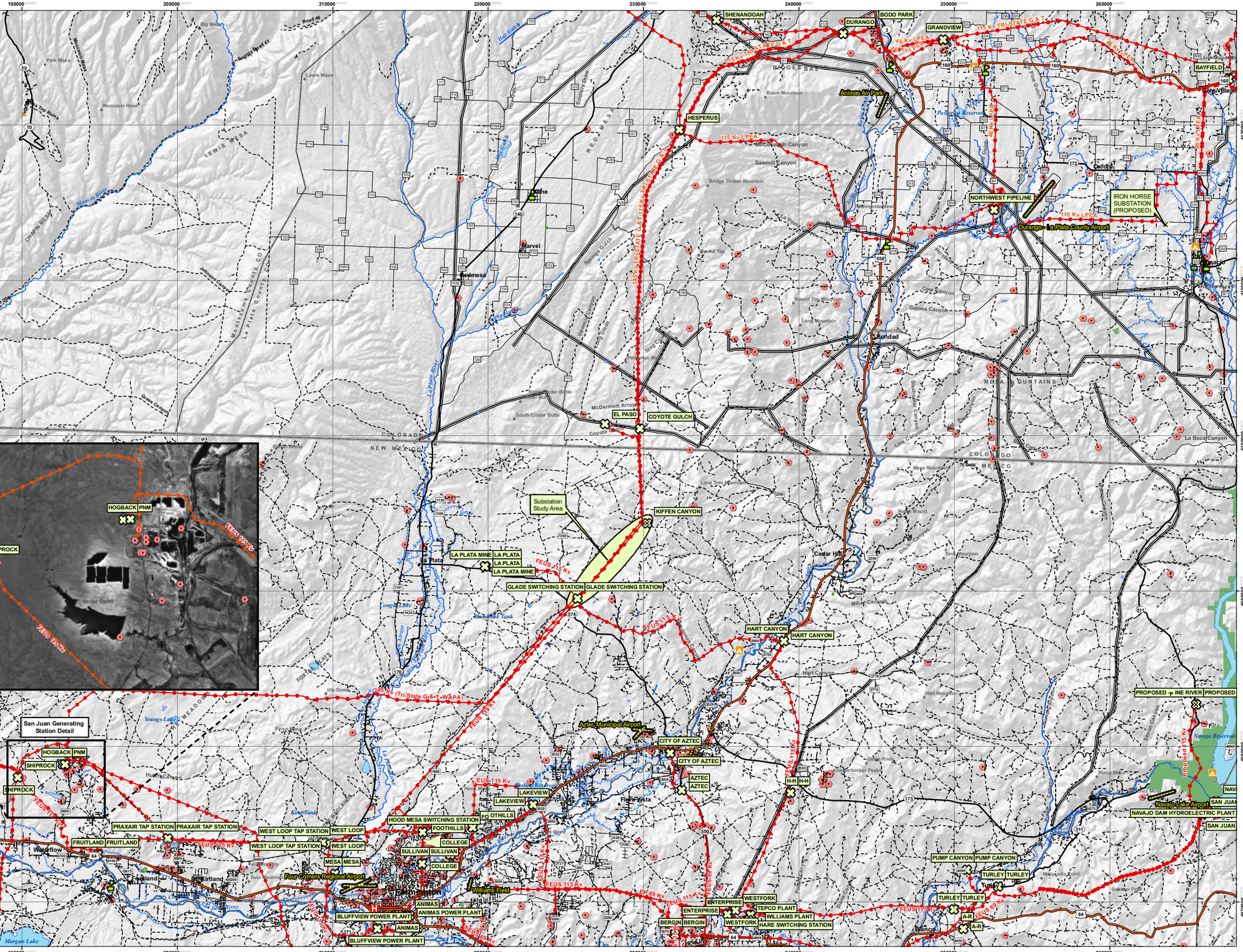


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Figure A-6: Geologic Constraints and Oil and Gas

La Plata and Montezuma Counties, Colorado and San Juan County, New Mexico

Geologic Formation

- Kch - $_{CL}$ IFF HOUSE SANDSTONE
- Kkf - KIRTLAND SHALE AND FRUITLAND FORMATION
- Kmf - $_{M}$ ENEFEE FORMATION
- Kmp - $_{M}$ ENEFEE FORMATION AND POINT LOOKOUT SANDSTONE
- Kmv - $_{M}$ ESAVERDE FORMATION, UNDIVIDED
- Kmu - MANCOS SHALE Upper Part
- Kpc - $_{P}$ ICTURED CLIFFS SANDSTONE
- Kpcl - $_{P}$ ICTURED CLIFFS SANDSTONE AND LEWIS SHALE
- Kls - LEWIS SHALE
- Kpl - $_{P}$ IERRE SHALE Lower unit
- Km - $_{M}$ ANCOS SHALE
- Qa - $_{M}$ ODERN ALLUVIUM
- Qd - $_{G}$ LACIAL DRIFT OF PINEDALE AND BULL LAKE GLACIATIONS
- Qg - GRAVELS AND ALLUVIUMS
- Qgo - $_{O}$ LDER GRAVELS AND ALLUVIUMS
- TKa - $_{AN}$ IMAS FORMATION
- Tmi - $_{M}$ IDDLE TERTIARY
- Toa - $_{OJ}$ O ALAMO
- Tsj - $_{S}$ AN JOSE FORMATION
- Tn - $_{NA}$ CIMIENTO FORMATION
- The Fruitland-Pictured Cliffs Contact
- 1.5 miles from the F-PC Contact
- 2 miles from the F-PC Contact

Gas and Mining Facilities

- Gas Wells
- Natural Gas Pipelines (CO Only)
- Surface Mine
- Coal Mine Permit Boundaries

Hydrology (Medium Resolution NHD)

- Canals / Ditches
- Perennial Streams
- Lake / Reservoir

Existing Electric Infrastructure

(Tri-State, LPEA, WAPA, FEUS)

- Transmission Lines
- Substation
- Proposed Substation

USGS
Colorado and New Mexico 1:500,000 Geologic Maps

NMEMNRD
Coal mine permit boundaries
New Mexico surface mines
New Mexico gas wells

COGCC
Colorado gas wells
Fruitland coal boundaries

COLORADO GEOLOGIC SOCIETY
Natural gas pipelines

COLORADO DIVISION OF RECLAMATION MINING & SAFETY
Colorado surface mines

1:110,000

0 0.5 1 2 3 4 Miles

Map Projection: Universal Transverse Metcator Zone 13
Datum: North American 1983 (CONUS)

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110k_Geology.mxd

Potential methane seep and/or coal fire

Potential subsidence within San Juan Coal Mine permit boundary

Substation Study Area

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Figure A-7: Special Conservation Areas

La Plata and Montezuma Counties, Colorado and San Juan County, New Mexico

New Mexico

BLM Specially Designated Areas (SDAs)

- Cultural
- Geology
- Paleontology
- Recreation
- Recreation/Wildlife
- Riparian
- Riparian/T&E
- T&E Species
- Wildlife

Colorado

Potential Conservation Areas

- B1: Outstanding Biodiversity Significance
- B2: Very High Biodiversity Significance
- B3: High Biodiversity Significance
- B4: Moderate Biodiversity Significance
- B5: General Biodiversity Interest

Hydrology (Medium Resolution NHD)

- Canals/ Ditches
- Perennial Streams
- Lake / Reservoir

Electric Infrastructure

(Tri-State, LPEA, WAPA, FEUS)

- Transmission Lines
- Substation
- Proposed Substation

Sources:

BLM
New Mexico Specially Designated Areas

COLORADO NATURAL HERITAGE PROGRAM
Colorado Potential Conservation Areas

1:110,000

0 0.5 1 2 3 4 Miles

Map Projection: Universal Transverse Metcator Zone 13
Datum: North American 1983 (CONUS)

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Figure A-8: BLM ACECs

La Plata and Montezuma Counties, Colorado and San Juan County, New Mexico

BLM Areas of Critical Environmental Concern (ACEC)

- Bald Eagle
- Cultural
- Mesa Verde Cactus, Mancos Milkvetch
- River Tract

Hydrology (Medium Resolution NHD)

- Canals/ Ditches
- Perennial Streams
- Lake / Reservoir

Electric Infrastructure

(Tri-State, LPEA, WAPA, FEUS)

- Transmission Lines
- Substation
- Proposed Substation

Sources:

BLM
Areas of Critical Environmental Concern (ACEC) Boundaries

1:110,000

Miles
0 0.5 1 2 3 4

Map Projection: Universal Transverse Mercator Zone 13
Datum: North American 1983 (CONUS)

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110k_ACECs.mxd

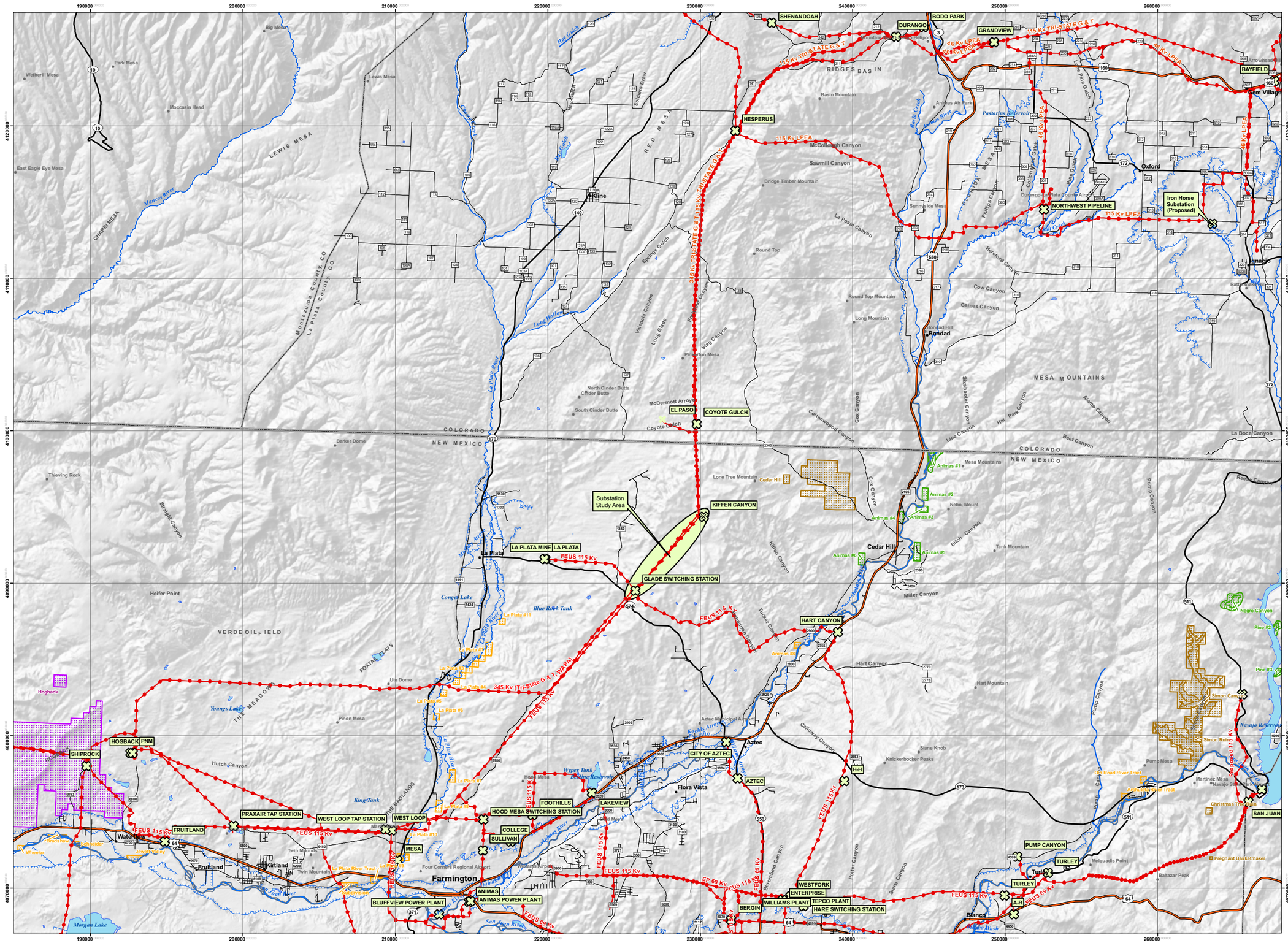

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Figure A-9: Topography and Hydrology

La Plata and Montezuma Counties, Colorado and San Juan County, New Mexico

Elevation

High : 2440

Low : 1372

Hydrology (Medium Resolution NHD)

- Canals / Ditches
- Intermittent Streams
- Perennial Streams
- Lake / Reservoir
- Springs
- NWI Wetlands
  Partial data only available for San Juan County, NM and La Plata County, CO

Existing Electric Infrastructure

(Tri-State, LPEA, WAPA, FEUS)

- Transmission Lines
- Substation
- Proposed Substation

Sources:

USGS
National Elevation Dataset (30m)
National Hydrography Dataset (High Resolution)
- prings
National Hydrography Dataset (Medium Resolution)
- treams and Lakes
- S

USFWS
National Wetlands Inventory

1:110,000

Miles
0 0.5 1 2 3 4

Map Projection: Universal Transverse Metcator Zone 13
Datum: North American 1983 (CONUS)

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110K_Topography.mxd

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Figure A-10: Vegetation

La Plata and Montezuma Counties, Colorado and San Juan County, New Mexico

Vegetation Type

- Barren Lands, Non-specific
- Developed/Disturbed
- Agriculture
- Grassland / Forbland
- Sagebrush
- Low Elevation Shrubland
- Low Elevation Rock and Sand
- Pinon Juniper
- Wetland / Riparian
- Open Water
- Aspen
- Oak Shrubland
- Ponderosa Pine
- Mesic Mixed Conifer

Hydrology (Medium Resolution NHD)

- Canals / Ditches
- Perennial Streams
- Lake / Reservoir

Electric Infrastructure

(Tri-State, LPEA, WAPA, FEUS)

- Transmission Lines
- Substation
- Proposed Substation

Sources:

SOUTHWEST REGIONAL GAP PROGRAM
Landcover Data

1:110,000

Miles
0 0.5 1 2 3 4

Map Projection: Universal Transverse Mercator Zone 13
Datum: North American 1983 (CONUS)

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110K_Vegetation.mxd

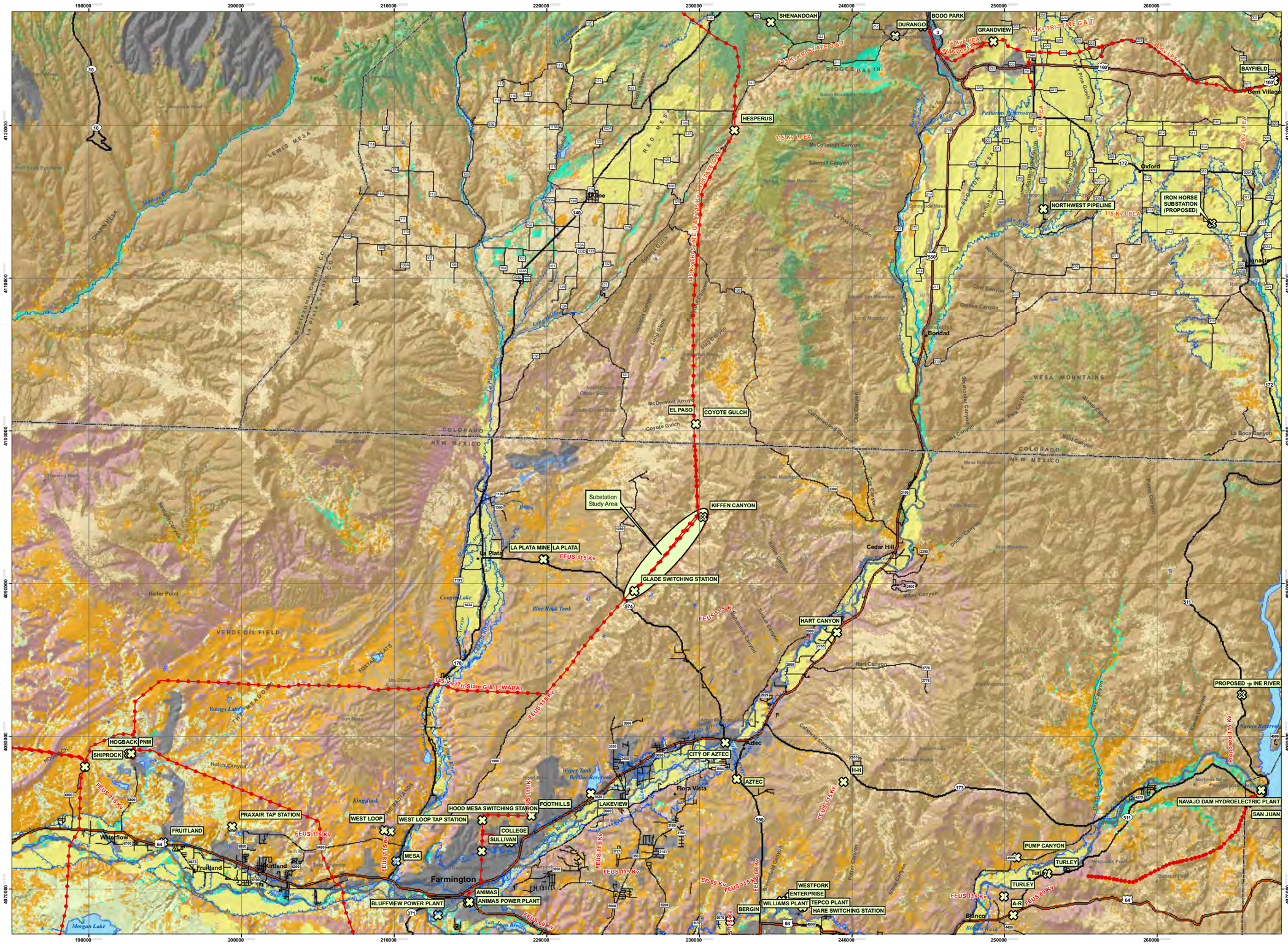

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Figure A-11: Biological Resources

La Plata and Montezuma Counties, Colorado and San Juan County, New Mexico

Colorado

- BALD EAGLE Nesting and Roosting Site
- BALD EAGLE Winter Concentration
- ELK Migration Corridor
- ELK and/or MULE DEER Production Area
- ELK Severe Winter Range
- MULE DEER Severe Winter Range
- ELK & MULE DEER Severe Winter Range
- PEREGRINE FALCON Nesting Area
- PEREGRINE FALCON Potential Nesting Area
- RIVER OTTER Overall Range

New Mexico

- Potential Aztec Gilia and/or Brack's Cactus (BLM Only)
- Potential Knowlton's Cactus (BLM Only)
- Prime Knowlton's Cactus (BLM Only)
- Raptor Habitat (BLM Only)
- Prairie Dog Colonies (BLM Only)
- Colorado Pikeminnow Critical Habitat

BLM Areas of Critical Environmental Concern (ACEC)

- Bald Eagle
- Cultural
- Mesa Verde Cactus, Mancos Milkvetch
- River Tract

Hydrology (Medium Resolution NHD)

- Canals/ Ditches
- Perennial Streams
- Lake / Reservoir

Electric Infrastructure

(Tri-State, LPEA, WAPA, FEUS)

- Transmission Lines
- Substation
- Proposed Substation

Sources:

CDOW
Colorado Wildlife Habitat

SOUTHERN UTE INDIAN TRIBE
Elk calving and Mule deer fawning within tribal boundary

USFWS
Colorado Pike Minnow Critical habitat

BLM
Other New Mexico TES Habitat
Areas of Critical Environmental Concern (ACEC) Boundaries

1:110,000

Miles
0 0.5 1 2 3 4

Map Projection: Universal Transverse Metcator Zone 13
Datum: North American 1983 (CONUS)

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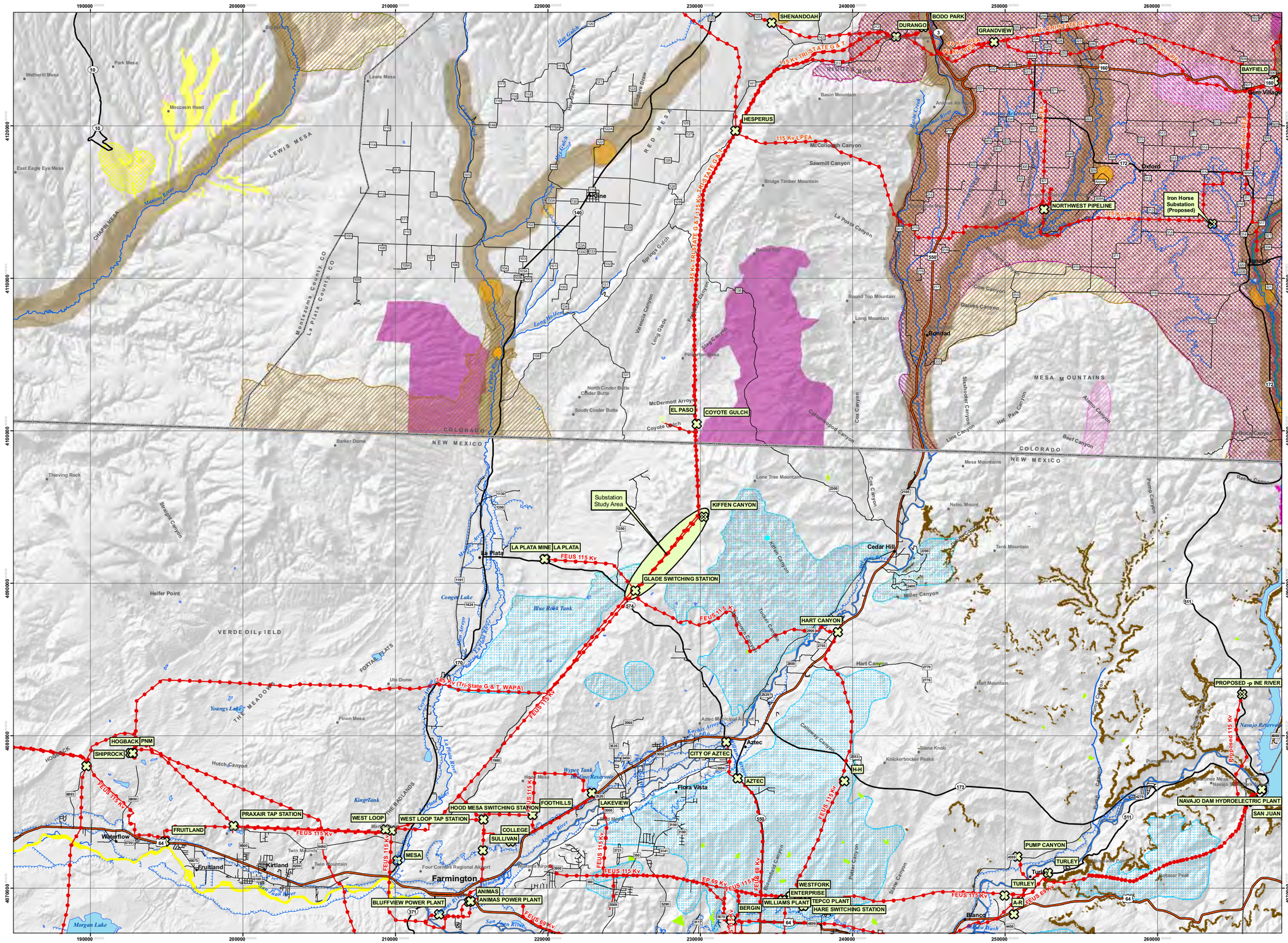

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San Juan Basin Energy Connect

Figure A-12: Slope

La Plata and Montezuma Counties, Colorado and San Juan County, New Mexico

Slope (Percent)

- 0 - 5 %
- 5 - 15 %
- 15 - 25 %
- > 25 %

Hydrology (Medium Resolution NHD)

- Canals / Ditches
- Perennial Streams
- Lake / Reservoir

Electric Infrastructure

(Tri-State, LPEA, WAPA, FEUS)

- Transmission Lines
- Substation
- Proposed Substation

Sources:

Slope: Derived from USGS 30m Digital Elevation Model Using ArcGIS 3D Analyst software

1:110,000

Miles

0 0.5 1 2 3 4

Map Projection: Universal Transverse Metcator Zone 13
Datum: North American 1983 (CONUS)

ECOSPHERE ENVIRONMENTAL SERVICES

TRI-STATE Generation and Transmission Association, Inc. A Touchstone Energy Cooperative

March 27, 2009

110K_Slope.mxd

APPENDIX B: FEDERALLY SPECIALLY DESIGNATED AREAS

Specially Designated Areas (SDAs), within the San Juan Basin Energy Connect Study Area

SDA Name	Type of SDA	Resource for which SDA is Designated	Surface Use Stipulations (ROWs)[1]	Seasonal Restrictions	Acreage[2]
Alien Run	Bike Trails	Recreation	Rights of way (ROWs) granted on a case-by-case basis with site-specific management constraints that protect the trail system integrity and recreation values and provide for the safety of users.	During Events	3,363.6
Animas River Tracts 1, 2, and 8	Area of Critical Environmental Concern (ACEC)	T&E Species (BAEA)	No Surface Occupancy (NSO)	11/01-03/31	303.9
Animas River Tracts 3-6	ACEC	Riparian/ T&E Species (BAEA)	Controlled Surface Use (CSU)	11/01-03/31	359
Archuleta River Tract	ACEC	Riparian/ T&E Species (BAEA)	NSO	NA	64.2
Beechatuda Tongue	Geologic Formation	Geology	Preclude new ROWs that would negatively affect protected resource or purpose.	NA	100.6
Bohanon Canyon Complex	Fossil Area	Paleontology	ROWs granted on a case-by-case basis with management constraints that protect paleontological values.		13,845.6
Cedar Hill	ACEC	Cultural	New ROWs placed in existing ROWs corridors.	NA	1,948.6
Christmas Tree Ruin	ACEC	Cultural	No new ROWs issued.	NA	42.9
Dick Earl Canyon Core Area[3]	ACEC	T&E Species (BAEA)	No ROWs in core areas.	11/01-03/31	171.6
Dick Earl Canyon Unit[3]	ACEC	T&E Species (BAEA)	ROWs permitted on a case-by-case basis with special stipulations and mitigations.	11/01-03/31	400.9
Ditch Canyon	Ephemeral Wash	Riparian-Active and 100-year floodplain	Special management constraints and mitigation would apply on ROWs.	NA	164.1
Dunes Vehicle	Recreation Area	Recreation	ROW permitted on a case-by-case basis with management constraints and mitigation measures. Safety of users and recreational use will be first consideration.	NA	824.7

SDA Name	Type of SDA	Resource for which SDA is Designated	Surface Use Stipulations (ROWs)[1]	Seasonal Restrictions	Acreage[2]
East LA Plata	Wildlife Area	Big Game	Allow ROWs on a case-by-case basis with special management constraints and mitigation.	12/01-03/31	7,092.6
Frances 5 & 6 core areas	ACEC	T&E Species (BAEA)	No ROWs in core areas.	11/01-03/31	96.4
Frances 5 Unit and 6 Unit	ACEC	T&E Species (BAEA)	ROWs permitted on a case-by-case basis with special stipulations and mitigations.	11/01-03/31	213.3
Frances Mesa	ACEC	Cultural	No new ROWs in Frances Ruin ACEC and Romine Canyon SMA. New ROWs must be placed in existing ROW easement for additional acreage.	NA	7,803
Glade Run	Trail System	Recreation	ROWs granted on a case-by-case basis with site-specific management constraints that protect the integrity of the trail system and other recreational activities in the SDA and provide for the safety of users. No construction or maintenance activity allowed when it would interfere with authorized recreation events.	NA	21,563
Gobernador Reach #1-3	Ephemeral Wash	Riparian-Active and 100-year floodplain	Special management constraints and mitigation would apply on ROWs.	NA	369.2
Hogback	ACEC	T&E Species (MVC, Mancos milkvetch)	ROWs permitted on a case-by-case basis with special stipulations and mitigations.	NA	10,238
Jewett Valley River Tract	ACEC	Riparian/T&E Species	NSO	NA	70.7
La Plata 1-11 River Tracts	ACEC	Riparian/T&E Species	NSO	NA	601.4
La Plata River Tract	ACEC	Riparian/T&E Species	NSO	NA	53.4
Largo Canyon Reach 1	Ephemeral Wash	Riparian-Active and 100-year floodplain	Special management constraints and mitigation would apply on ROWs.	NA	855.8
McDermott Wash	Ephemeral Wash	Riparian-Active and 100-year floodplain	Special management constraints and mitigation would apply on ROWs.		

SDA Name	Type of SDA	Resource for which SDA is Designated	Surface Use Stipulations (ROWs)[1]	Seasonal Restrictions	Acreage[2]
Middle Mesa	Wildlife Area	Big Game	Allow ROWs on a case-by-case basis with special management constraints and mitigation.	12/01-03/31	46,060
Navajo Lake	Horse Trails	Recreation	ROWs granted on a case-by-case basis with site-specific management constraints that protect the trail system integrity as well as special status species being managed in the SDA, and provide for the safety of users. No construction or maintenance activity allowed when it would interfere with authorized recreation events, and from 11/1 through 3/31 for Bald Eagle (BAEA) protection.	11/01-03/31	6,763
Negro Canyon Drainage	Special Management Area (SMA)	Recreation	Preclude new ROWs from Negro Canyon drainage and on the No Surface Occupancy acreage in the Negro Canyon SDA. Permit ROWs on Controlled Surface Use acreage above the rim, on a case-by-case basis with site-specific management constraints that maintain recreation and natural values, VRM objectives and wildlife habitat.	NA	1478 +1992
Negro Canyon Core Area	ACEC	T&E Species (BAEA)	No ROWs in core areas.	11/01-03/31	93.4
Negro Canyon Unit	ACEC	T&E Species (BAEA)	ROWs permitted on a case-by-case basis with special stipulations and mitigations.	11/01-03/31	282
Old Road River Tract	ACEC	Riparian/T&E Species	NSO	NA	39.8
Pine 1, 2 and 3 Core Site	ACEC	T&E Species (BAEA)	No ROWs in core areas.	11/01-03/31	11.8
Pine 1, 2, and 3 Units	ACEC	T&E Species (BAEA)	ROWs permitted on a case-by-case basis with special stipulations and mitigations.	11/01-03/31	156.2
Piñon Mesa	SMA	Recreation	ROWs granted on a case-by-case basis with site-specific management constraints that protect the trail system integrity, recreational, visual, and threatened and endangered species values in the SDA and provide for the safety of users. No construction or maintenance activity allowed when it would interfere with authorized recreation events and from 3/1 through 6/30 for various raptor species protection and 3/1 through 8/1 for peregrine falcon protection.	03/01-06/01	9,470
Piñon Mesa	Fossil Area	Paleontology	ROWs granted on a case-by-case basis with management constraints that protect paleontological values.	NA	19,073

SDA Name	Type of SDA	Resource for which SDA is Designated	Surface Use Stipulations (ROWs)[1]	Seasonal Restrictions	Acreage[2]
Pregnant Basketmaker	ACEC	Cultural	New ROWs in ACEC must be placed in existing ROW disturbance.	NA	7.9
Pump Canyon Reach #1-5	Ephemeral Wash	Riparian-Active and 100-year floodplain	Special management constraints and mitigation would apply on ROWs.	NA	274.2
Rattlesnake Canyon	Wildlife Area	Big Game	Allow ROWs on a case-by-case basis with special management constraints and mitigation.	12/01-03/31	11,0307
Reese Canyon[4]	Research Natural Area (RNA)	T&E Species	ROWs permitted with special stipulations and mitigation.	NA	2,419.6
Rock Garden	Recreation Area	Recreation	ROWs granted on a case-by-case basis with site-specific management constraints that protect the trail system integrity and values in the SDA and provide for the safety of the users. No construction or maintenance activity allowed when it would interfere with authorized recreation events.	NA	9,658
Rosa Mesa	Wildlife Area	Big Game	Allow ROWs on a case-by-case basis with special management constraints and mitigation.	12/01-03/31	69,772.5
San Rafael Canyon	ACEC	Cultural	New ROWs in ACEC must be placed in existing ROW disturbance.	NA	5,680
Simon Canyon	ACEC	Recreation	ROWs are precluded from Simon Canyon drainage, granted in remainder of ACEC on a case-by-case basis with stipulations to maintain natural, recreation, and visual values.	NA	2,002.4
Simon Canyon River Tract	Ephemeral Wash	Riparian-Active and 100-year floodplain	Special management constraints and mitigation would apply on ROWs.	NA	46.6
Simon River Wash	Ephemeral Wash	Riparian-Active and 100-year floodplain	Special management constraints and mitigation would apply on ROWs.	NA	26.9
Simon Ruin	ACEC	Cultural	No new ROWs in ACEC.	NA	46.8
Subdivision River Tract	ACEC	Riparian/ T&E Species	NSO	NA	69.3

SDA Name	Type of SDA	Resource for which SDA is Designated	Surface Use Stipulations (ROWs)[1]	Seasonal Restrictions	Acreage[2]
Thomas Canyon	Recreation/Wildlife Area	Recreation	Preclude ROW placement on unleased acreage. ROWs on CSU acreage permitted on a case-by-case basis with site specific stipulations to maintain recreation and natural values, VRM objectives and wildlife habitat.	11/01-04/15	3,865 unleased acres; 15,731 CSU acres

[1] River Tracts do not have management prescriptions specific to ROWs in the FFO Resource Management Plan, in red.
[2] For Ephemeral Washes, the acreage is from the 100-year floodplain.
[3] Core areas are nesting or roosting areas for bald eagle, Unit = core area plus ¼ mile buffer zone.
[4] Reese Canyon is a Research Natural Area (RNA) for endangered plant habitat (Knowlton's cactus).